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# ***Skyways*** ANC

Flight  
Operations  
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Engineering  
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WAYS Round Table:  
Traffic Control

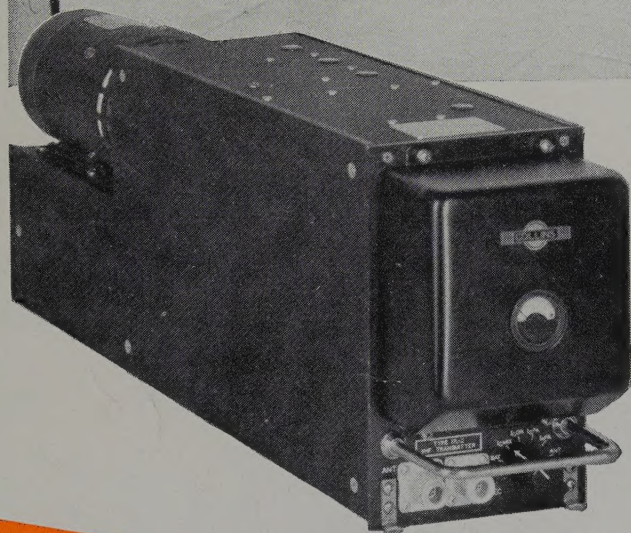
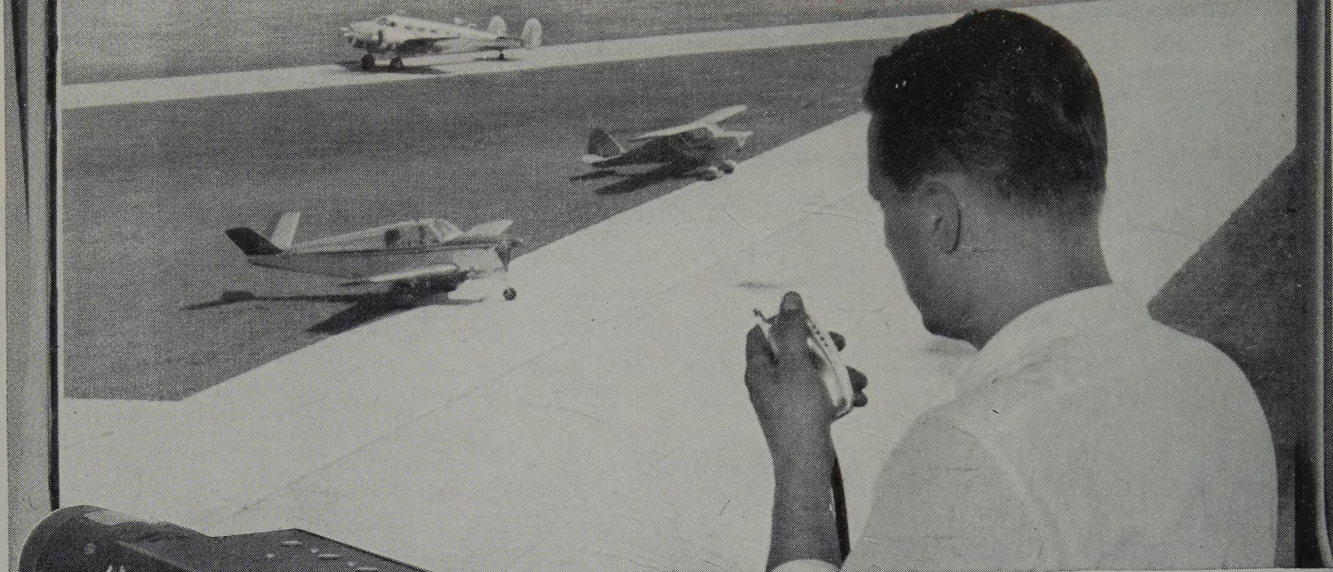
•  
Report: Martin 404

•  
Turboprop Airplane

•  
Executive Aircraft

•  
Maintenance: DC-3

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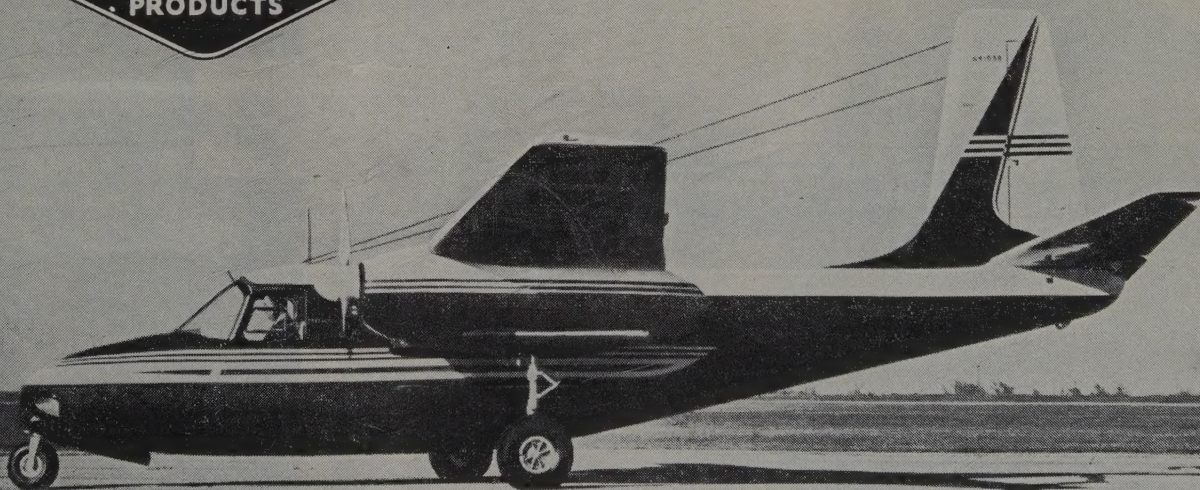
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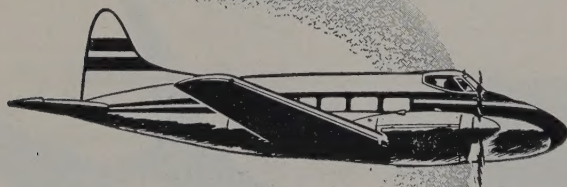
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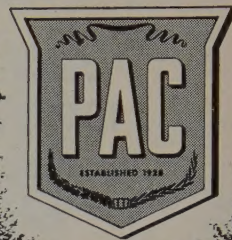
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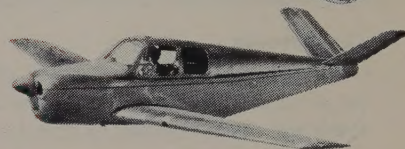
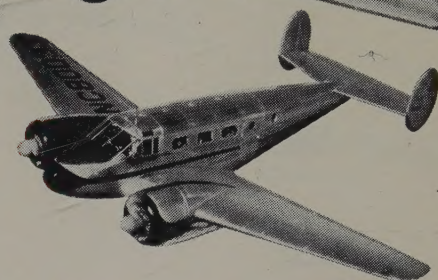
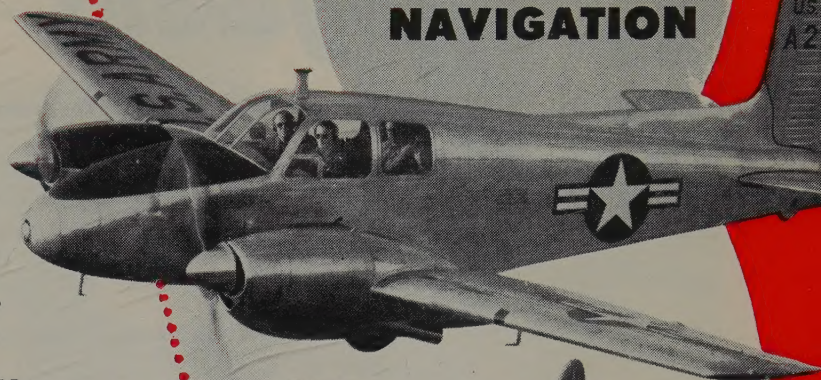
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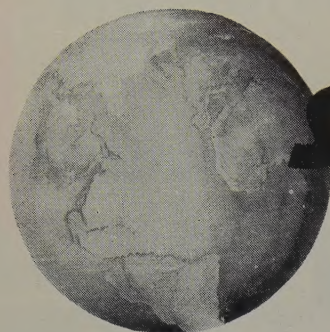
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# Skyways

OCTOBER 1952

Flight Operations • Engineering • Management

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*TWA and Eastern Airlines are flying new Martin 4-0-4's on domestic routes. The 4-0-4 seats 40*



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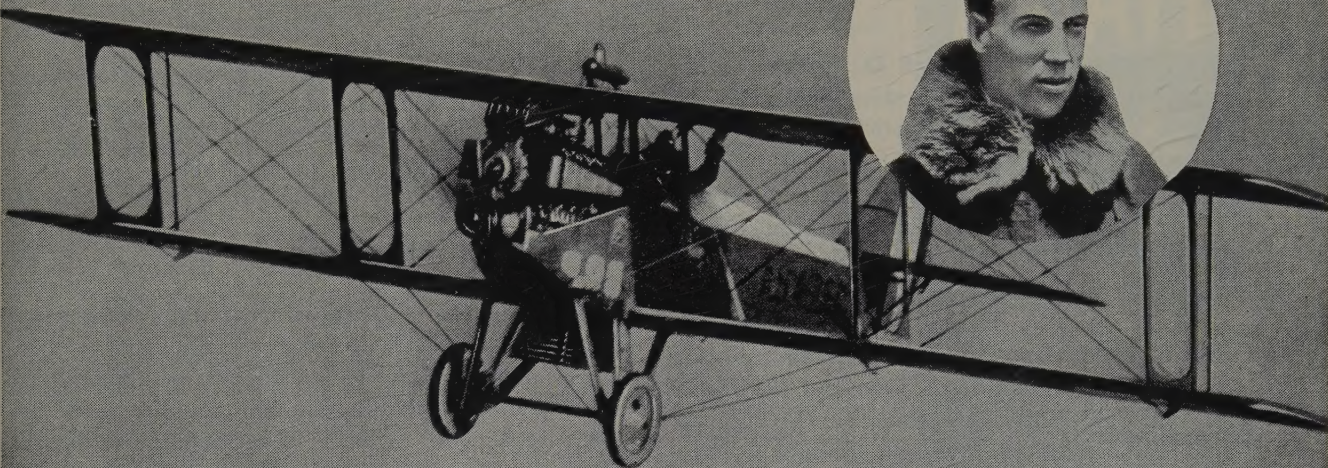
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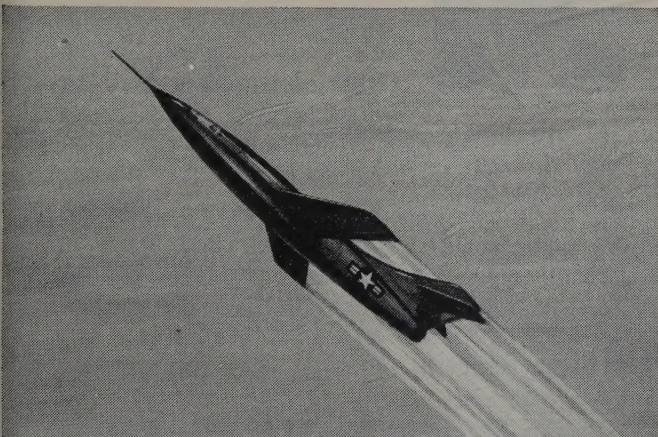
# High Flyer 1920

A daring flyer of the twenties, Major Rudolph ("Shorty") Schroeder, sent his super-charged Le Pere plane to its utmost ceiling of 38,180 feet back in 1920 to set a new world record! He received nation-wide acclaim for one of the greatest feats of the day!



# High Flyer 1951

Another day, another record! Just thirty-one years later at Muroc Dry Lake, California, the U. S. Navy's *Skyrocket* powered by 4 rockets and air launched from a modified B-29 bomber, soared into space at "unprecedented" heights and speeds, topping *all* previous speed and altitude records.



● This remarkable thirty-year record of progress is indicative of the course that lies ahead! There is *no limit* to the vistas that may be opened up for those who fly!

And future improvements in design, speed and endurance of planes will be matched by equally important developments in aviation fuels.

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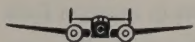
## AVIATION PRODUCTS

# in this issue...

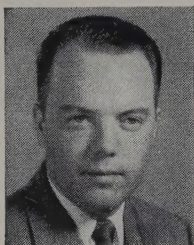


**Herbert O. Fisher**, author of "Executive Pilot's Report: Martin 4-0-4," recently was named Chief of the Aviation Development Division of the Aviation Department of the Port of New York Authority. Formerly Executive Director of the Corporation Aircraft

Owners Association, Herb was released from his duties by CAO A following a letter to CAO A from the N.Y. Port Authority asking that CAO A make Herb available for appointment to this new position. In his work with the New York Port Authority, Herb expects to devote much of his time to the promotion of executive aircraft operations in the New York area and to the solution of executive aircraft operation problems. He is a pilot well equipped to evaluate aircraft and their adaptability as executive transports. The Martin 4-0-4 article is the first of a series of evaluation tests of current corporate-type aircraft.



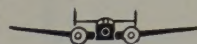
► Wm. T. Arthur, the power behind the article, "Flight Maintenance of the DC-3," is V.P.-Operations for Chicago & Southern Air Lines. Working with C&S' 12 DC-3's (the lines flies Connies, too), Mr. Arthur is in a good spot, experience-wise, to detail flight maintenance cues for the many executive operators of the ole stand-by DC-3.



**Bill Fox**, 31-year-old Project Engineer on the Consolidated Vultee XP5Y-1 and author of "The Turboprop Airplane," has been a Convair mainstay since 1943 when he became a member of Convair's Experimental Flight Test Group. A graduate of the Mechanical

Engineering school at the University of Virginia, Mr. Fox was supervisor of the Flight Test Engineering activities for Convair's San Diego Division at the time of the initial flights of the Model XP5Y-1

and the Convair Turboliner. He became Project Engineer on the XP5Y-1 and its U. S. Navy counterpart, the R3Y, in 1951. One of aviation's youngest engineers, he is also one of its most able.



► With millions of men, women and children throughout the U. S. peering at millions of TV screens night and day, it's perhaps only natural that TV should at last find its way into the cabin of the executive airplane. Arthur C. Ward, manager of the Electronic Dept. of Atlantic Aviation, Teterboro, N. J., tells the how's of a TV installation in Cornell Dubilier Electric Corporation's DC-3.



**Christopher Clarkson**, author of the article "British Executive Aircraft," is former Civil Air Attaché at the British Embassy in Washington. A Group Captain of the Royal Air Force, presently on inactive duty, Chris Clarkson served as RAF representative

with British Air Commission in New York from 1940 to 1944. He became Chief of Test Branch, British Air Commission in Washington in 1944. His work necessitated some 400 hours test flying on over 50 different American aircraft types. He was awarded the Air Force Cross for these efforts. Since 1924, when he first became a part of the RAF, Chris Clarkson has flown 186 types of aircraft.



► Next Issue: Next month's Flight Operations Round Table will deal with the "Problems in Turboprop-Turbojet Air Transport Operations." Among the participants will be leading engineers of aircraft companies, and operations officials of several of the large airlines. Also in the next issue will be an Executive Pilot's Report of the new twin-engine Aero Commander, a light transport designed specifically for high-utility operations in the field of corporate flying.

# air your views . . .

## Pilot Error . . . or Human Factor

Gentlemen:  
I just finished reading "The Airline Pilots Look at Safety" by William Moss appearing in a recent issue. Capt. Moss has dealt admirably with a subject which has long been a point of contention with many people.

The category of "Pilot Error" accidents surely cannots a full responsibility on the shoulders of the pilot, whereas primary responsibility in many such instances rests elsewhere. It would seem to me that instead of "Pilot Error" as a category, a broader more objective term such as "Human Factor" should be used. Further breakdown could then be provided as to whether the accident appears to have been caused through inadequate consideration of "Human Factor" by:

1. An aircraft designer.
  2. One who devised operational procedures.
  3. One whose responsibility it is to see that proper proficiency and procedure observance is maintained, or
  4. Primary error on the part of the pilot.
- Nothing is to be gained at this point in theorizing as to what percentage of accidents heretofore charged to the broad category of "Pilot Error" would fall in each of the above-mentioned four sub-headings, but surely substantially less than 100% would remain as "Pilot Error."

I think that of special significance is Captain Moss' reference to the seaplane incidents wherein three seaplanes ended up on a coral reef before it was finally recognized that other than "Pilot Error" was involved in the situation. Unfortunately or fortunately, there is not always sufficient operation under "Twilight safety" of inadequate design or improper procedures to get three seaplanes on a reef and prove a point. Proper objective analysis of why one seaplane ended up on a reef however, might have prevented the following incidents instead of fattening the "Pilot Error" file.

R. DIXON SPEAS  
Aviation Consultant

LaGuardia Field  
New York, N. Y.

Pilots agree with you 100%, Mr. Speas.—  
Ed.

## U. K. Ahead

Gentlemen:  
Judging from recent news stories of the British Overseas Airways' De Havilland Comet all-jet airliner, I'd say the British have done it again . . . beaten us to the punch. Has the American aircraft industry a jet airliner in the offing, so that once again we can stand on an equal footing with Great Britain?

J. HOWARD MONTGOMERY  
Buffalo, N. Y.

There are several jet-airliner designs on the drawing boards. According to reports, both Douglas and Lockheed are working in that direction. However, there is always a long period of time between drawing board and actual certification, and so don't expect the U. S. to lead the jet-airliner field anytime soon. In the meantime, much work is being done on propjet aircraft and also transports powered by compound engines. It is interesting to note here that the trip time of a compound-engine powered air transport (Lockheed) is faster than that of a pure jet. The speed of a jet airliner is faster, but it burns fuel so rapidly that it has to land to refuel oftener than the airliner powered by compound engines. The time lost by the jet airliner's having to land several times for fuel is a trip-time gain for the compound-engine powered airliner that doesn't have to make so many stops.—Ed.

## Lightplanes as Weapons

Gentlemen:  
I'd like to put in my word for the use of lightplanes as tactical weapons. Your recent article on the Thorp FC-25 indicates to me that this corporation is really looking ahead. Having had the opportunity to observe air strikes in progress, I can't help but feel a genuine enthusiasm for the possibility of airplanes of the light class at last coming into their own as definitely destructive support weapons. It's not hard to see where this plane has decided advantages in ground-support action. With the typical Korean terrain in mind, it occurs to me that one big advantage lies in the lightplane's high degree of inherent maneuverability, allowing the ship to get in and out of small hollows, valleys, etc., while still permitting the craft's destructive ordnance to be delivered with a high degree of accuracy.

Without a doubt, the psychological aspects would be another favorable factor. Having a large number of these planes in action would contribute to the peace of mind of friendly troops. There's nothing more comforting than the sound of planes overhead when they are your own, and there's nothing that instills more fear in the enemy. Keeping those planes in the air during the day could very nearly negate enemy action during daylight.

Certainly the F-80's and F-51's are doing a fine job here, and in many cases they have performed functions for which they were not intended. However, it has happened before and will happen again, that these planes have mistakenly fired on their own troops.

Let's let the lightplanes perform this ground-support front-line action . . . and let the bigger faster ships handle the interdiction and behind the lines operation.

Sgt. R. N. RIGGS, USA  
Korea

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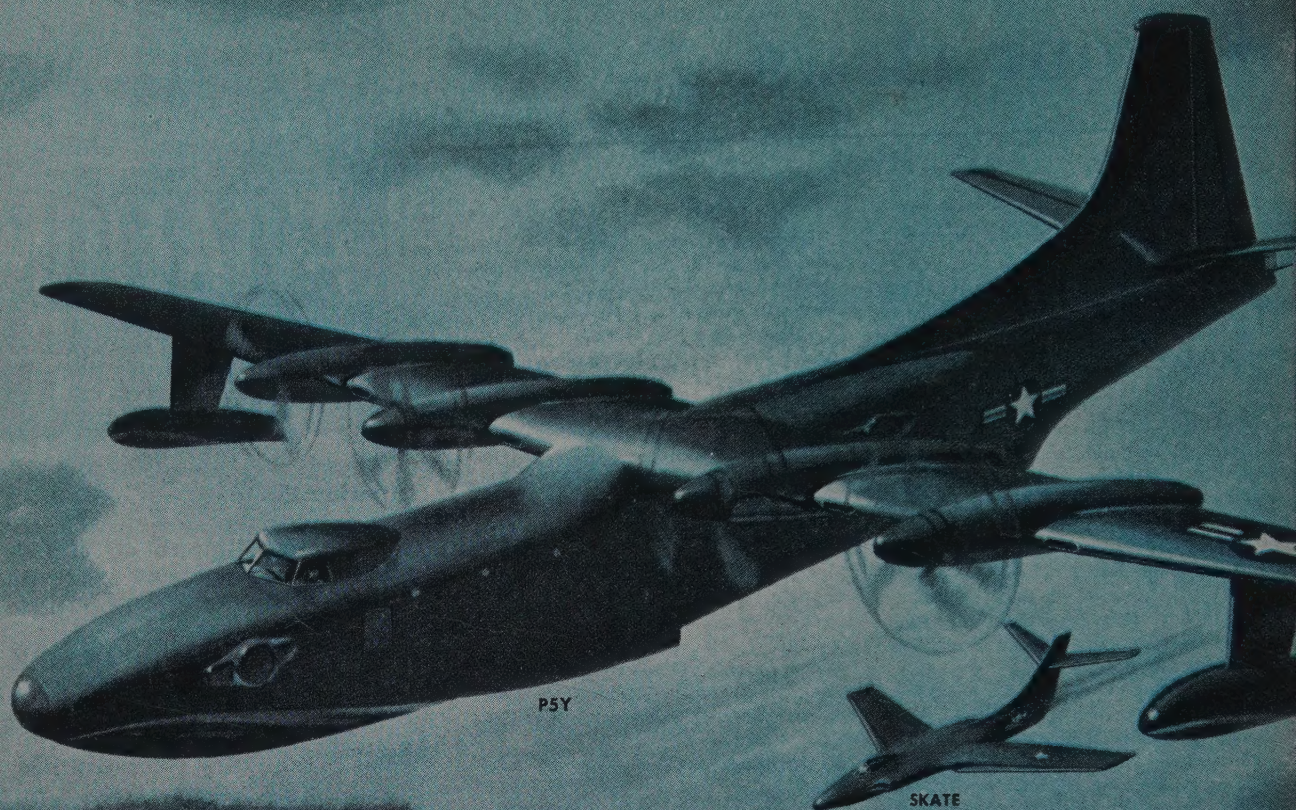
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☐ Aircraft Blueprint Reading  
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Further results of Convair's hydrodynamic studies: the jet fighter-bomber "Skate" design, capable of sonic speeds *anywhere*; and now research on a *supersonic* water-based Delta Wing.

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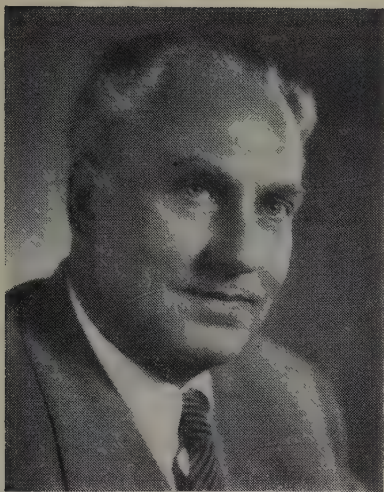


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# 10th Anniversary

► This month marks the 10th Anniversary of SKYWAYS, 10 years that have seen outstanding developments in aviation: jet propulsion that has spanned the field of military aircraft and is now surging the speeds of commercial transports; electronic devices that portend the age of automatic flight; radio and radar aids that lift the veils of weather. These developments and others point the way to even greater accomplishments in the years to come. To keep its readers abreast of these accomplishments, aware of the resultant problems and informed of their developed solutions, SKYWAYS dedicates itself, beginning with this issue, to specialization in one of the most important branches of aviation—Flight Operations. A regular feature of the new SKYWAYS is the Flight Operations Round Table, established to maintain close touch with operational developments and the pros and cons of many controversial problems. Participants at these round-table discussions will be leading authorities in all the fields of flight operation. The discussions will be recorded and published in full in each issue. The new SKYWAYS is a magazine authored by recognized specialists actually engaged in flight operations. Thus, it will have authenticity and reflect realism in its treatment of the many problems. The decision to concentrate our efforts in the field of flight operations was made after two years of study of the trends in air progress, and that decision was impelled by expressed requests for this coverage from aircraft owners, operators and active and professional pilots.

*J. Fred Henry*



# Skyways

**JEROME LEDERER**, moderator of the Round Table, has been a well-known figure in aviation for many years. Formerly Director of CAB Safety Bureau, he is now Director of Flight Safety Foundation.

**S. P. SAINT**, currently Director of Air Navigation Traffic Control Division of the ATA, is a former American Airlines captain and engineering test pilot. He maintains status as active airline pilot.

**D. S. LITTLE**, Assistant to Director of Flight, American Airlines, began his career with AA as a pilot-radio engineer in 1939. During the war, he was Cmdr., Radio-Electrical Branch, of U. S. Navy BuAer.

**LT. COL. S. P. BETTINGER**, USAF, is Deputy Chief Pilot of the Military Air Transport Service. He was Air Traffic Control Officer in Berlin during the Airlift and aided in the development of procedures for controlling masses of aircraft in all types of weather.

**WM. A. PARENTEAU**, Chief, Airport Traffic Controller, LaGuardia, was appointed an Airport Traffic Controller in 1942. He was assigned to LaGuardia Tower in '45 to work Approach Control. He was made a Supervisor in 1946, and Chief Controller in '48.

**NORMAN R. SMITH**, Radar Coordinator, became a tower operator in 1940. In 1950 he was named Airway Operation Specialist for the Navigation Aids Evaluation Div. He became Radar Coordinator in '52.

**HOWARD W. PEMBER**, Captain, The Texas Co., joined American Airlines in 1942, became a captain in 1943. He joined Texas Co. in 1949, as executive pilot and is flying DC-3's and Convairs.

**HERBERT O. FISHER**, Chief, Aviation Development, Aviation Dept., N. Y. Port Authority, is a former test pilot for Curtiss-Wright. He spent 14 years and 9,000 flying hours testing new planes. His new position will be concerned with executive operations in the New York area.

**MURRAY BLOCK**, on Active Duty as Major, USAF, has been an Airway Operation Specialist for over 10 years.

**ALFRED B. BENNETT**, Vice President Taylorcraft, Inc., is a well-known aircraft service operator and airplane dealer.

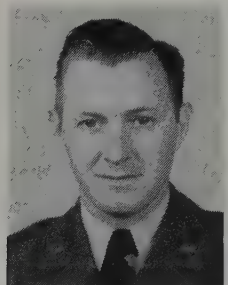
S. P. Saint

David S. Little



Lt. Col. S. P. Bettinger

Wm. Parenteau



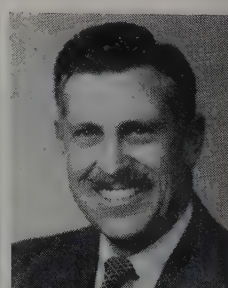
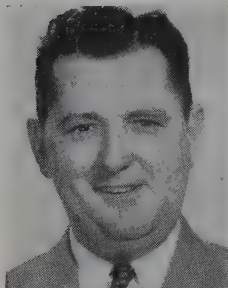
Norman R. Smith

Howard W. Pember

Herbert O. Fisher

Murray Block

Alfred B. Bennett



# Flight Operations Round Table

## Air Traffic Control

**COLE MORROW**, Chairman of the Board of Directors of CAO, is an active pilot (Commercial, Instrument rating) and a powerhouse in behalf of the development of corporate flying. He is Chief Plant Engineer, J. I. Case Co., Racine, and a member of Institute of Electrical Engineers.

**PAUL HUSAK**, Senior Flight Dispatch Coordinator of TWA, is one of the most qualified men in actual flight dispatch operations today, both domestic and international flights. He joined TWA back in 1930.

**RALPH D. BYRNES JR.** has been employed in the field of air traffic control for past 11 years. He attended radar school in 1946 and is presently concerned with Region I's (N. Y.) long-range radar program.

**CAPT. A. L. UELTSCHI** joined Pan American Airways in 1940 and was named to head up Pan Am's executive transportation department in 1942, a position he still holds. Flight Safety Inc was formed in 1951. He's logged 12,000 hrs.

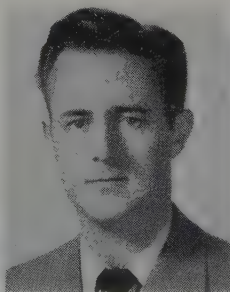
**Jerome Lederer** (Pres. Flight Safety Foundation):

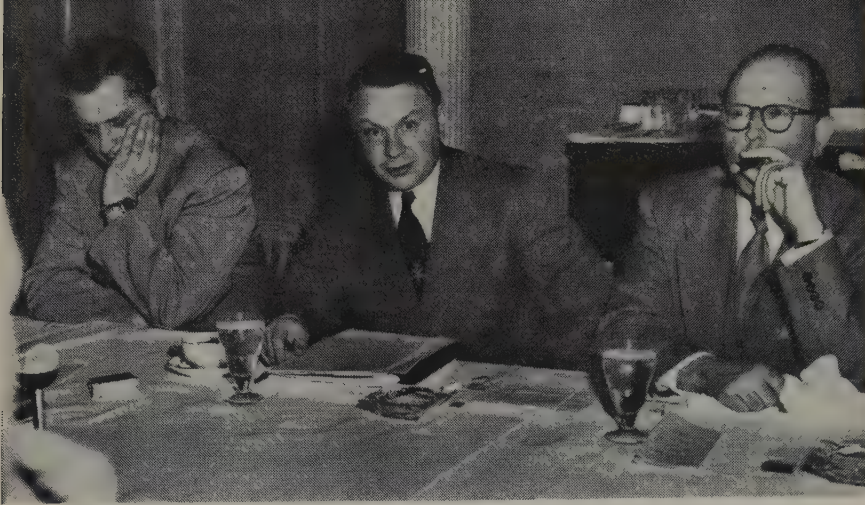
"The purpose of this forum is to discuss ways and means of improving air traffic control and reducing collision hazards with the facilities currently available or that will be available in the near future. The records show that in the past five years there have been seven mid-air collisions involving air carriers carrying between one and 20 people. From 1944 to 1950 there were 106 mid-air collisions involving non-carrier aircraft. The number of near-misses is unknown, but it must be enormous. I occasionally receive reports on near-misses, and one came in recently from an airline pilot who said he missed a Cessna by 20 feet. I think this happens too frequently for the good of aviation. The danger is not alone that of the collision itself but the distraction caused by the fear of collision which reduces the efficiency of the crew, especially under critical conditions. This forum should disclose the loop holes in regulations, the deficiencies in training, violations and lack of enforcement of regulations, and the differences in the interpretation of regulations which lead to the danger of mid-air collisions. Nearly every phase of aircraft operation is represented at this meeting. We have purposely not invited government people of the very highest level, because we felt that they would talk in terms of the distant future and broad policy rather than in terms of what is actually facing the industry today in the way of the collision hazard. We want no crystal-ball gazing. We

Cole Morrow

Paul Husak

Ralph D. Byrnes, Jr.    Capt. A. L. Ueltschi





**MODERATOR** Jerry Lederer (center) reports on near-misses at Flight Operations Round Table. With Jerry are Norman "Huck" Smith (left) and Bennett H. Horchler (right), Assist. Pub.

want this meeting to be on a very practical immediate basis.

"To start the discussion off I would like to cite a few typical examples of mid-air collisions or near-collisions. The first involves a collision between an airliner and a private plane. The pilot of a PT-23 caught in rain and darkness, no lights, no radio, approaching for a landing, struck the fin of a scheduled DC-3 also approaching for a landing. The Tower at this field was inoperative. The pilot of the PT heard a noise, pulled up, applied power and crash-landed near by. The pilot of the DC-3 didn't know his plane had been hit until the ramp agent pointed to the bent fin. They then thought it was a bird strike, until pieces of the PT were found on the runway by another airplane pilot. Fortunately, nobody was killed.

"The second one involved two airliners. One flight was at its assigned altitude of 5500 feet at 9:20 CST when another flight was observed in close proximity on its right on a course of about 260°. A sharp turn was immediately initiated and a collision was averted by not over 200 feet. The pilot stated, 'I was incoherent for 24 hours afterwards.'

"The third was a near-collision between a military transport and an air carrier. Here are a few extracts from the report:

'Copilot—"My eyes apparently swept right on up for at the next moment I was looking out the Captain's main windshield panel and noted the green navigation light and a complete silhouette of the aircraft at approximately 11 o'clock off our nose on a collision course with ours and at our altitude. My impression was that we were going to collide, and I let out a 'Yipe!' At the same time I reached for the control column to pull the plane up sharply and over to the right. I estimate the distance between aircraft at the time we passed to be somewhere be-

tween 25 and 50 feet vertically—no more than that.'"

"A note here says that the evasive maneuver was sufficiently violent to break the ankle of a passenger in the men's room.

"I recently heard of another incident. This was a rather close one involving two air transports circling over Flushing for 29 minutes in turbulent air, on instruments, both at 3500 feet.

"About nine months ago this collision problem became rather apparent, so I went down to Washington and discussed it with Don Nyrop, Ernest Hemsly and others in the CAA and CAB. I brought up these points. The problem of reducing mid-air collision hazards could be attacked in three ways:

- 1) Flight discipline and education
- 2) Cockpit procedures

**CONFAB** before the Flight Operations Round Table brought Al Bennett (left), Cole Morrow, and Capt. Al Ueltschi together to discuss private, executive pilot problems



### 3) Facilities

"By 'flight discipline' I meant—

A) An educational campaign by airlines, by ALPA, by CAB and by all other organizations involved in safety to emphasize that good airmanship requires more than just following Civil Air Regulations. All pilots should be urged to follow altitude separation and fly right side of airways even under VFR conditions. Form good habits for all flying.

B) Pilots should be sold on the need to be honest and accurate in reporting fixes, the time leaving and entering control areas, and whether they are actually 500 feet on top or not.

C) Private pilots should be educated to the need to follow altitude separation by sea-level pressure not by reference to altitude at point of take-off.

D) Put on a periodic drive, perhaps by setting aside a special week, to make it a must to check altimeters and compasses.

E) Reports on near-misses to be sent out as part of an educational campaign.

F) Coordinate the essential portion of the above with military and foreign operators, notably Item A on altitude separation with visual flight regulations. That is flight discipline.

"In connection with cockpit procedures we discussed:

A) Reorganized cockpit procedures in transport type aircraft so that there is a constant watch for other traffic. The watch always should be done in a set pattern, not haphazardly.

*SKYWAYS' Flight Operations Round Table on air traffic control once more illustrates the problems involved in air traffic. The solutions must give consideration to all categories of air transportation: private, executive, commercial and military. As pilots, you undoubtedly have opinions. Let us have the benefit of them. Address your comments to Editor, Box 4, SKYWAYS, 444 Madison Avenue, New York 22, N. Y.*

B) Cut out the paper work in climb and descent.

C) Outline typical procedures to illustrate how this should be accomplished for various types of airplane.

"On the matter of facilities—

A) Encourage installation of anti-collision lights.

B) Determine if Approach Control can reduce collision hazards under marginal VFR conditions when non air-carrier pilots tend to criss-cross the control areas waiting for tower clearance.

C) Review CAB visibility regulations to determine if a more rational basis would be on time rather than on distance; that is, put pattern visibility in terms of *minutes* rather than *miles*.

D) Determine the practicability of the flight-level indicator developed currently by CAA and Kollsman.

E) Check into the use of radar responders.

"Those are the main (Continued on page 38)

**PRE-SESSION** get-together found participants previewing air traffic control questions. They are (left to right) Murray Block, Norman Smith, Paul Husak (back to camera),

Ralph D. Byrnes, Jr., Bill Parenteau of the LaGuardia Tower, Sam Saint, and John Wiley of the N.Y. Port Authority. Mr. Wiley could not stay for the round-table discussion



executive pilot's report:

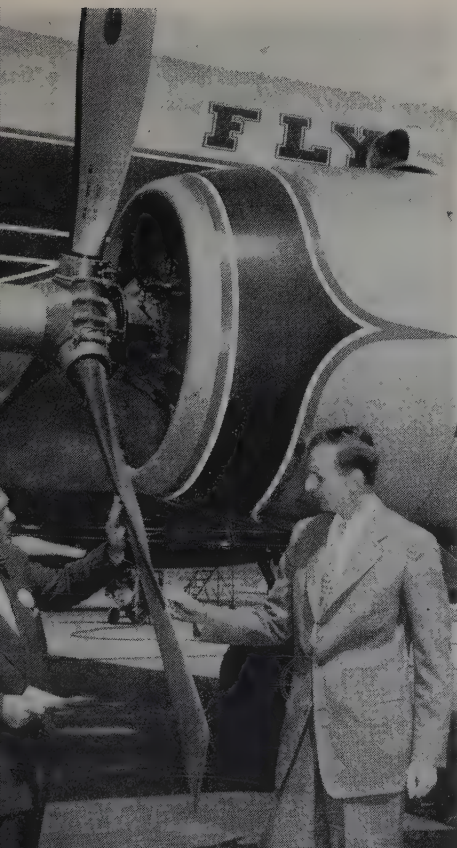
# martin 4-0-4

by

*Herb Fisher*

Chief, Aviation Development, Port of N.Y. Authority

**CHECK PILOT** *Herb Fisher inspects de-icing boots on one of 4-0-4's Hamilton Standard three-bladed propellers. With Herb is George Rodney, manager of flight operations for the Glenn L. Martin Co.*



No transport-type aircraft has ever met completely all its basic design requirements, but I have just flown one which measures up to the mark in more ways than other comparable airplanes I have handled. It is Martin's 40-passenger, twin-engine 4-0-4.

This pressurized plane, now flying domestic routes operated by Eastern Airlines and Trans-World Airlines, ranks among the world's most advanced piston-engine airliners.

My evaluation flight was made in the 35th 4-0-4 scheduled to be delivered to Eastern, whose experts helped to write the exacting specifications laid before Martin's engineering and production teams early in 1950. George A. Rodney, manager of flight operations for the Glenn L. Martin Company and a former B-24 combat instructor, was my host.

It was obvious, from the moment I settled into my seat in the nose of the plane until we taxied back to the hangar, that the designers had the pilot in mind at all times when they blueprinted the cockpit. It's a pilot's airplane.

Unlike other multi-engine airplanes I have known, the 4-0-4 has a beautifully arranged cockpit. All necessary controls are easily accessible to either pilot. No reaching, bending, straining, or scrounging around on the floor. Either pilot can operate the airplane with almost no assistance from the other.

The engine controls, the main electrical switches and the cabin heating controls are all within easy reach on the center of the overhead panel. At eye level under the glare shield are fire control and carbon dioxide selector pull valves. On the main quadrant at the top of the pedestal are prop controls, throttle, gear and flap controls, carburetor heat controls. At the base of the pedestal are all tab controls, including the elevator tab on each side. The entire radio panel is on the lower front side of the pedestal where all units can be reached from either seat with a minimum of effort.

Of particular interest to the pilot is the 4-0-4 windshield. It is double-paned and birdproof and has circulating hot air for anti-icing,



**MARTIN 4-0-4** (above) is currently in commercial airline use on domestic routes of Eastern Airlines and Trans-World Airlines. Herb Fisher calls the 4-0-4 "a pilot's airplane," with all necessary controls accessible to both pilots

**WHEELS** on the 4-0-4 can be changed in 5 minutes. Here, Herb looks over plane's strengthened gear

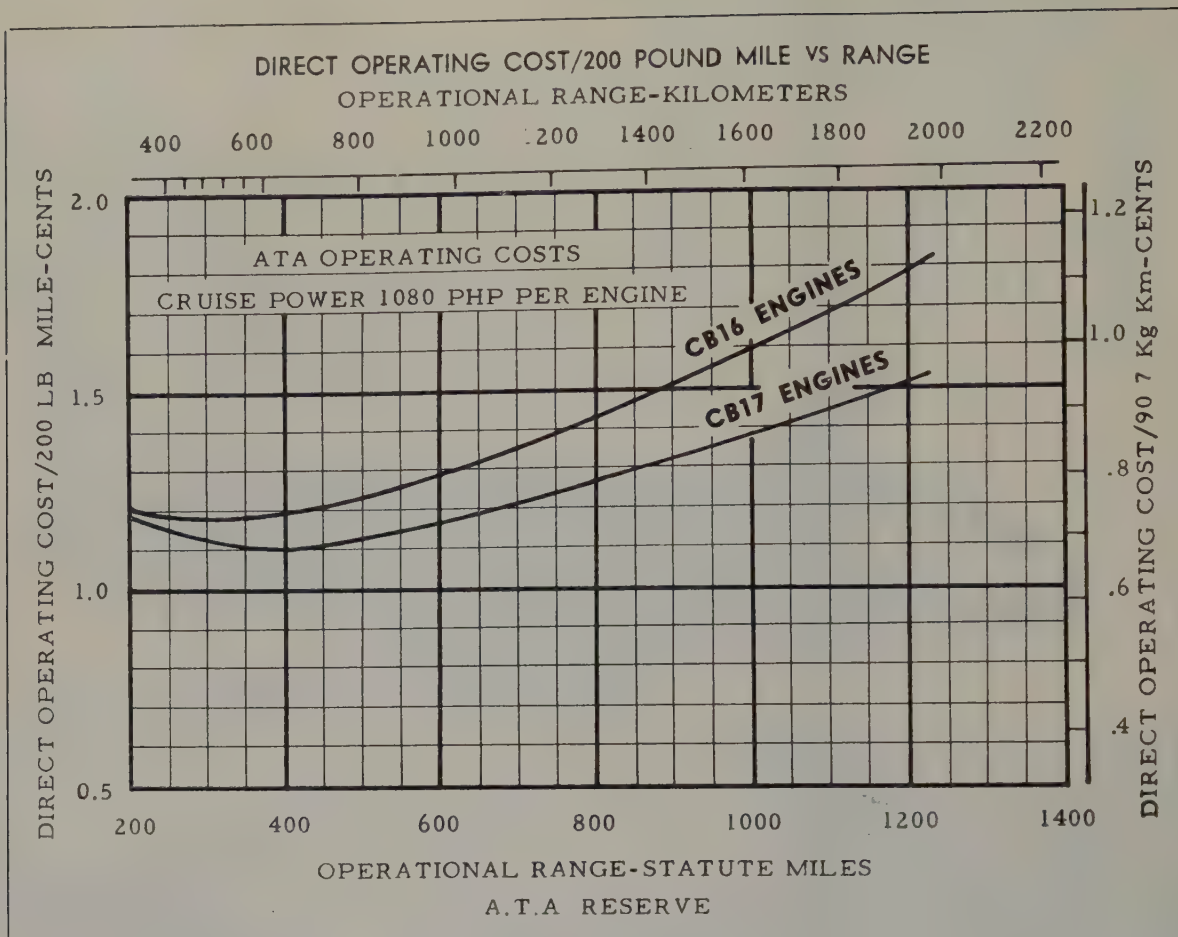
de-fogging and defrosting. Windshield and side windows have been placed as close as possible to the pilot to provide the best visibility, and the total glass area has been increased over that of the 2-0-2. Cockpit and instrument lighting are adequate to meet the greatest possible variation in lighting requirements. However, I doubt that there ever will be an airplane which won't call for the use of the proverbial flashlight.

No airplane is perfect and I found a few items not exactly to my liking. It seemed to me the microphone was inconvenient. It should be a bit more accessible to the pilot. On the pilot's side, the mike cord catches on the emergency brake handle. Over on the copilot's side, the mike cord could become entangled on the seat handle.

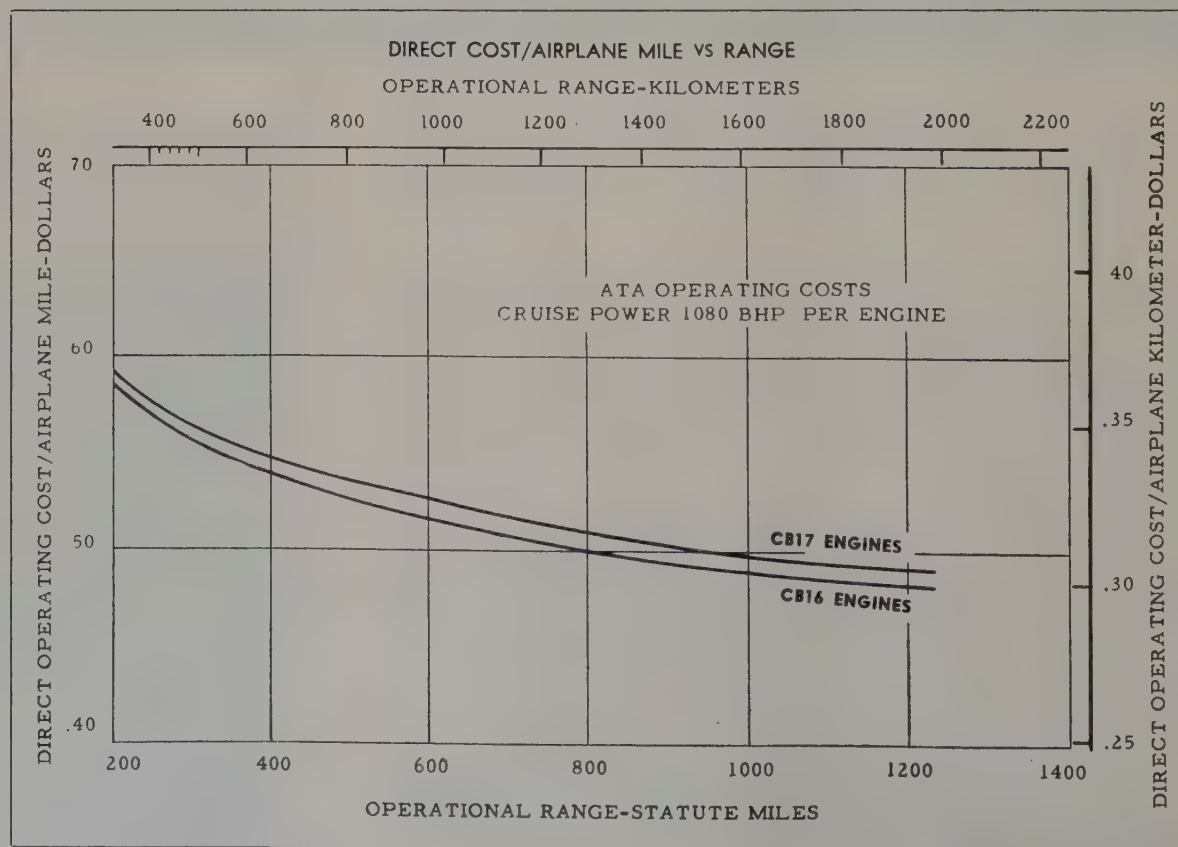
#### **Built-in Performance**

The 4-0-4 is a stable airplane. Our take-off was smooth, and it was apparent that the combination of low-wing design and sufficient





**OPERATING COSTS** of Martin 4-0-4 are shown on these two charts. Pilot Herb Fisher flew the 4-0-4 with CB-16 engines



dihedral, plus good handling qualities, gives the transport inherent stability. And that stability allows for a large permissible center of gravity travel, offering the operator unrestricted passenger seating with a wide variety of loading conditions for cargo and baggage.

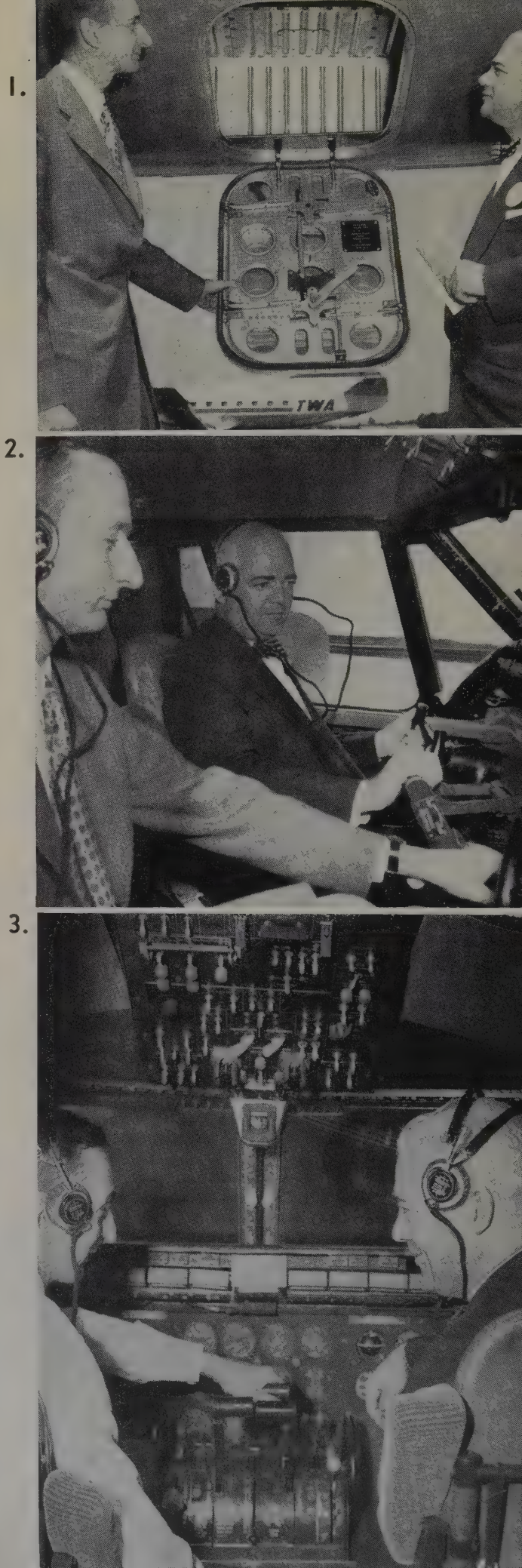
Airline operations with the 4-0-4 have demonstrated its good flying characteristics at low speed and extremely low maneuvering speeds. These features are a direct result of the efficient Martin-designed airfoil section, flaps and ailerons. The wing flaps are mechanically interconnected to the movable horizontal stabilizer, a device which minimizes trim changes resulting from flap movement. I can report that this feature of the airplane makes for greater safety during take-offs, landings and approaches.

Martin deviated somewhat from the conventional in its flap and aileron arrangement. By making the aileron smaller, Martin made possible a larger, double-slotted flap set-up. This flap-aileron combination provides low landing speeds with less wing area than would be required with standard flaps and ailerons.

I noted, too, that controllability on the elevators was good at low speeds. In fact, the pilot has longer control over the elevators on landing and there seems to be a few seconds of extra time after flare-out at landing. This aerodynamic change came about when the fuselage of the 4-0-4 was lengthened to take care of an extra row of passenger seats. The result is that the greater length provides better airflow back there. Another improvement is the new drag link on the main gear, helping to absorb much of the jolt at touchdown. That extra time at flare-out and the drag link will cut to an absolute minimum, I believe, such passenger comment as "my teeth popped out on that last landing."

Like the Martin 2-0-2, the 4-0-4 has a variable angulation horizontal (Continued on page 50)

**ONE OUTSTANDING FEATURE** of 4-0-4 is its ease of maintenance. Here (1) Herb and George Rodney inspect one of service hatches in belly compartment. The author, sitting in pilot's seat (2), gets cockpit briefing before take-off on test flight. Cockpit (3) was designed after consultations with hundreds of pilots. Main electrical switches are on overhead panel. Radio panel is at lower end of the throttle quadrant pedestal



# *the* TURBOPROP *airplane*

by *William M. Lox*  
*Project Engineer, Consolidated Vultee*

**T**he turboprop airplane as we know it today requires somewhat of a transition in thinking from the usual design characteristics of reciprocating engine-powered aircraft. To date there have been five turboprop-powered airplanes flown in the United States for an approximate total accumulative flying time of 150 hours. This total is not what might be called impressive, considering the time period involved, and leads to the obvious conclusion that turboprop engines are still in the embryo stage of their development in the United States. Advancement of the turboprop engine will be aided considerably, however, as we apply the available experience to the solution of our mutual airframe and engine problems.

Convair flew the first turboprop-powered airplane in the U. S. in 1945. This airplane was the Vultee Division fighter designated XP-81. The XP-81 was equipped with a TG-100 turboprop engine in the nose. A total of 47 flights were made. Several months later the Ryan XF2R-1 was flown. This airplane also was equipped with a TG-100. A total of 19 flights were made with this airplane. After approximately 50 hours total flight time were accumulated between the two airplanes, the turboprop-engine developments were discontinued.

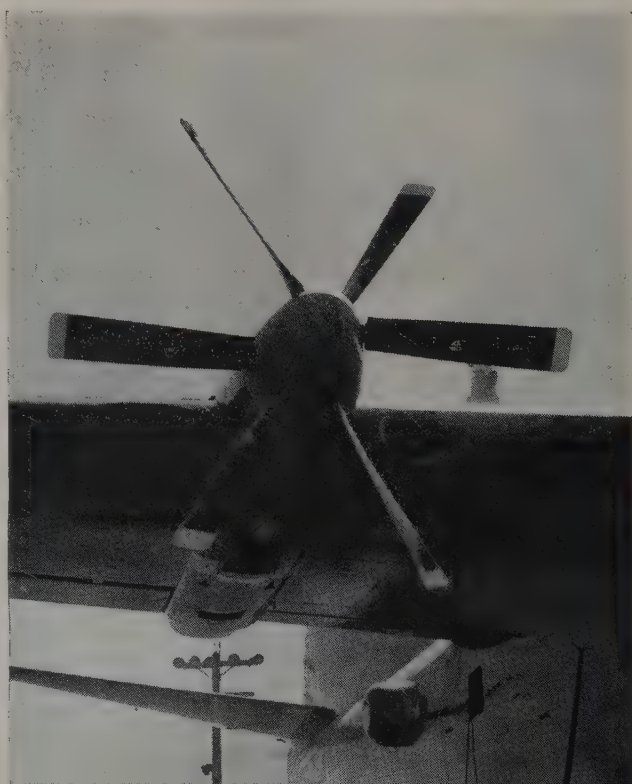
Further turboprop-airplane operating experience is being gained with a new stable of airplanes which began flying in 1950 using the Allison XT-38 and XT-40 engines. The San Diego Division of Convair first flew the XP5Y-1 airplane in April, 1950. To date 45 hours flying time has been accumulated in 20 flights. The El Segundo Division of the Douglas Aircraft Company first flew the XA2D airplane in May, 1950. The third airplane in this series, the General Motors-Convair *Turboliner*, was first flown in December, 1950. The most recent of these

series of airplanes is the North American XA2J airplane which made its initial flight in January, 1952. Within the next several years many more turboprop-powered airplanes will be flown. In addition, the production Douglas A2D airplanes and the Convair R3Y airplanes soon will be put into service by the U. S. Navy.

## **Operating Experience**

Convair's turboprop-operating experience consists of 35 hours with a single-engine airplane, 15 hours

**POWER** for the XP5Y-1 is supplied by four Allison T-40 turboprop engines driving Aeroproducts six-bladed contra-rotating propellers. Note air scoops on either side of T-40



with a twin-engine airplane and, at the writing of this paper, 45 hours with a four-engine airplane. In general, it can be said that the same lesson has been learned from all three types of airplanes. Engine failure can be a very disastrous situation. The solution to the problem of control of the magnitude and the asymmetry of the approach-condition thrust is by no means simple, but is very necessary to provide proper airplane-handling qualities. The basic engine-control system must have an extremely high degree of reliability since relatively minor failures can easily result in complete engine failure.

### Approach Thrust

The problem involved in the control of the magnitude of approach-condition thrust is somewhat unique to turboprop powerplants. Normal operation at idle throttle on the low-pitch propeller stop, which we are used to in reciprocating-engine installations, is entirely unsatisfactory in turboprop-equipped airplanes. This problem is created essentially by requiring a very low propeller blade angle to accommodate the required high idle speed for the turbine. The thrust vs. airspeed curve for constant blade-angle operation is extremely steep and, therefore, very large changes in thrust occur during a standard

landing approach, resulting in a severe ballooning or floating tendency in the airplane.

The effect of compressor bleed and other accessory load variations that affect engine-power output for a given fuel flow are to increase or decrease the negative thrust for any given airplane speed. A review of the above, as affected by tolerances, indicates fuel flow to be the most serious offender in thrust variations from the desired schedule. Trying to accommodate both AN-F-48 and AN-F-58 fuels is a problem which at the moment does not have a simple solution.

However, continued development is expected to produce solutions to this problem as well as to other problems that have arisen.

### Asymmetric Thrust

One of the most annoying problems encountered on multi-engine turboprop-powered airplanes has been the asymmetrical thrust variations during landing or stall approaches at idle throttle position. From the perfection standpoint, symmetrical thrust requires all engines to be operating at equal values of rpm, fuel flow, and propeller low-pitch blade angle. All mechanical contrivances must have manufacturing tolerances, and accumulation of these

**TURBOPROP** engines give the big seaplane a total of 22,000 T/O horsepower. With full load it can get off water in less than 30 seconds. It has top speed of about 400 mph





**TURBOLINER** is turboprop-powered version of the Convair-Liner. Powered by two Allison 2,750-hp units, it cruises at 300 mph

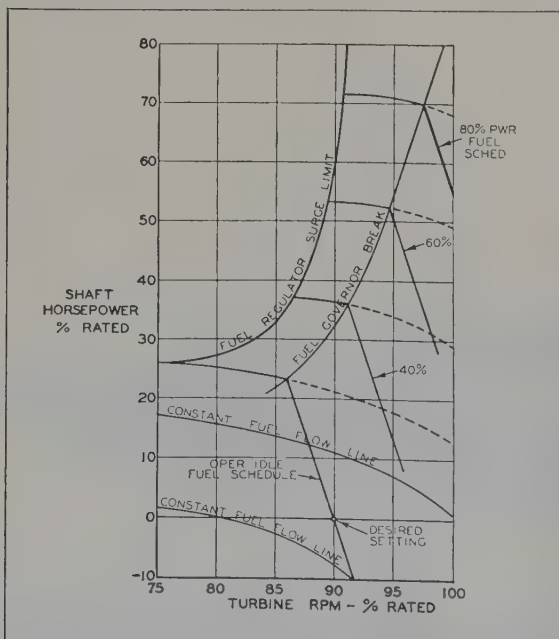
tolerances creates the asymmetric thrust problem.

Consider this problem in regard to open-sea operation of a multi-engine flying boat. The pilot makes his landing approach with a large amount of power at near-stall speed. When the sea immediately ahead of the airplane is as good as can be expected in the complex sea at hand, the throttles are cut and a full-stall landing is made. If the pilot should encounter severe rolling and yawing moments at the point of throttle cutting, loss of the airplane would be the probable result.

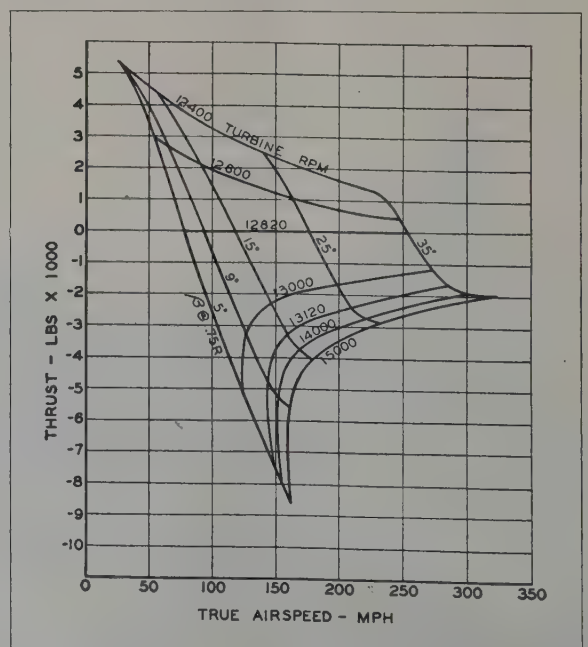
Studies made to date indicate that primary asymmetric thrust control will only result from very tight fuel-flow tolerances for the control systems now in

use. Another possible solution to the asymmetric-thrust problem is to have the propeller low-pitch stop set at a blade angle which will allow the engine to govern at the desired speed all the way down to the minimum stall speed of the airplane without encountering the propeller low-pitch stop. The variations in engine speed and fuel flow are then the only variables in the asymmetric thrust problem. Operation in this manner creates a more severe engine-failure problem which must also be solved before the method is due consideration. It must be kept in mind, however, if this solution is to be considered, that the propeller flight low-pitch stop must be set high enough (Continued on page 60)

**GRAPHS** show typical fuel schedule for turbine powerplant



**EFFECT** of the turbine speed on thrust at operational idle



# TV for Corporate Planes

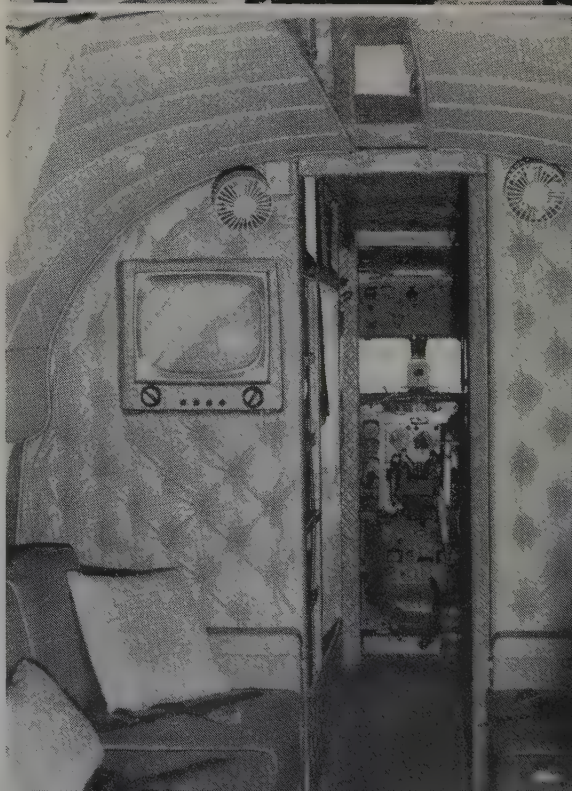
by Arthur C. Ward

Manager Electronics, Atlantic Aviation

The familiar living room arguments concerning selection of TV programs has become a reality in the executive aircraft. Television has joined the ranks of airborne electronic equipment. With the addition of visual entertainment, extended flights are converted into relaxing episodes for passengers formerly disinterested and resorting to card games and slumber to pass idle hours. A simple solution is the utilization of the vast entertainment available on television by custom installation in executive aircraft. Passengers can now enjoy their interest in sports, entertainment or news programs that were previously limited to their leisure hours at home.

Airborne reception of TV signals has proved excellent, aided by the advantage in elevation of antenna and receiver. Approximately 67 cities now have television stations and many new transmitters are planned with the lifting of the "freeze" by the FCC. In addition to changing frequencies of interfering VHF stations and implementing new VHF facilities, the high UHF spectrum will be assigned both for commercial and educational TV purposes, affording even greater coverage for the public. Many cities today are equipped with several TV stations, thus operating many channels, with more coming. Consistent reception at distances of 160 miles has been reported by airborne receivers at altitudes of 5,000 feet. These distances are far in excess of line-of-sight for that elevation. Obviously, a single station enroute will furnish about two hours of entertainment in the average executive transport. Under some conditions the programing will be uninterrupted as one station replaces another. Occasional co-channel interference may be experienced, but this is a temporary condition as displacement from one station is usually rapid. Separation of co-channel stations was established at 150 miles in order to minimize interference, but a new schedule of separation has been devised, based on findings from previous performances. This new schedule calls for co-channel separation to be in accordance with specific (Continued on page 52)

**ANTENNA** for television is modified AS-27A "Ram's Horn" (below, right) lengthened for best performance on low TV band



**TV SET** installed in Cornell-Dubilier DC-3 is 17-inch Admiral mounted on forward bulkhead for good passenger viewing

# BRITISH EXECUTIVE AIRCRAFT

**U.K. aircraft industry offers executive-plane**

**designs to meet U.S. corporate requirements**

by

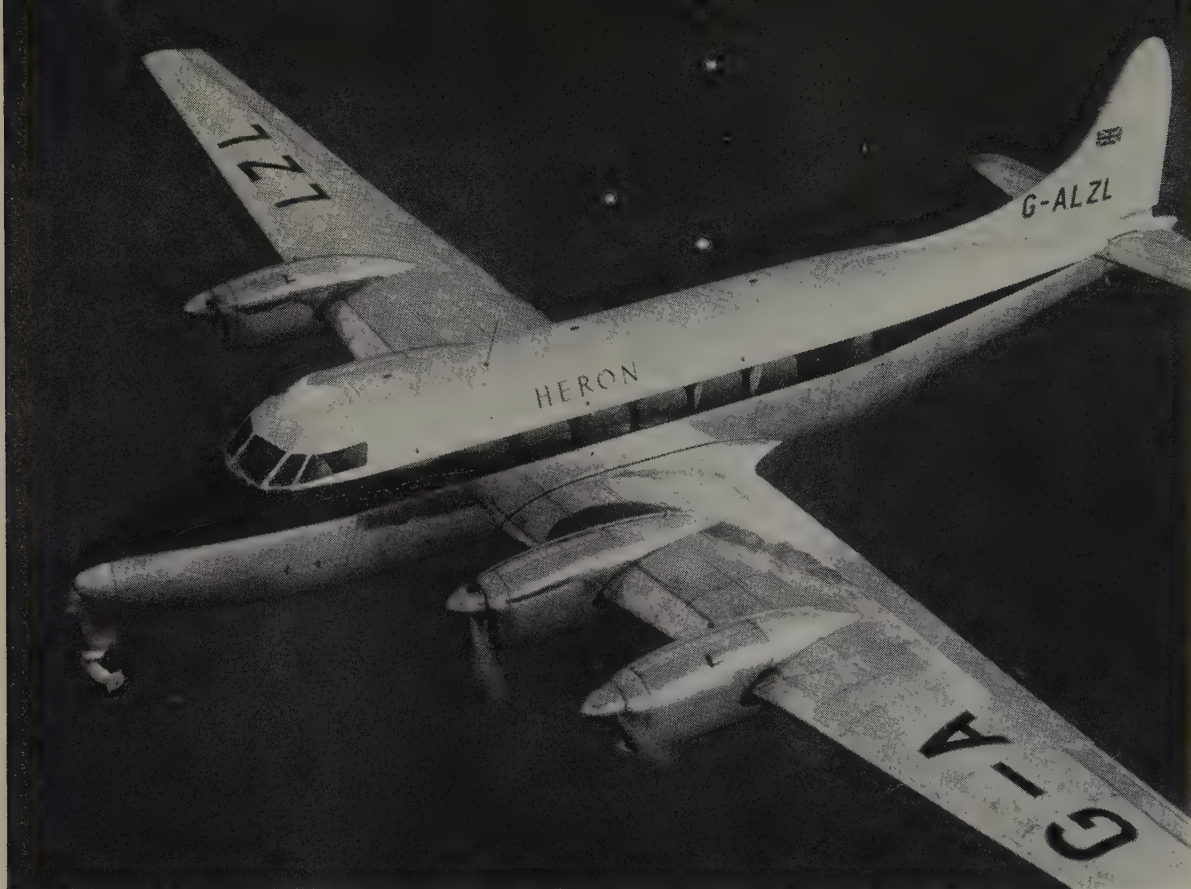
*Christopher Paulson*

**DE HAVILLAND** *Dove* is 5-passenger in its executive version. Already, there are more than 30 in corporate operation in the U.S. Feature is economy of operation

**I**t was in 1943 that the British Coalition Government decided that, when hostilities were over, they would need a blueprint to guide them in their postwar civil aviation development. Dark years were behind them, and before too long the war would be won and the British Aircraft Industry would be able to turn from its 100% war production effort and re-enter the civil transport market—a market that was, to start with anyhow, likely to be dominated by American-built transports. A committee of aviation experts was, therefore, appointed to draw up specifications for those commercial aircraft which might be needed to meet peacetime requirements. This committee was under the able chairmanship of Lord Brabazon of Tara, an aviator who had made his first flight in Britain in 1909 and who held British Aviators Certificate No. 1.

Lord Brabazon and his aides did a remarkable job. In 1944 they issued a series of specifications for various postwar transports that were—and still are—known as the Brabazon Types, and which set a pattern for British postwar civil development. These covered a wide field, and included the huge 300,000-lb. Bristol *Brabazon* (which has been flying as a research aircraft for two years), as well as the original suggestions for the well-known jet-powered and now operational de Havilland *Comet*, and some much smaller 8,000-lb. feeder-line aircraft. It was from this last specification that the British executive transports have sprung, and of the five types suitable for





this work being built in England today, two are directly based on the Brabazon recommendations.

These five aircraft, built by private firms in the belief that there was a world market for such types, are all in operation. They are the de Havilland *Dove*, de Havilland *Heron*, Handley Page *Marathon*, Percival *Prince* and the Short *Sealand*, the latter an amphibian flying boat. All, with the exception of the *Prince*, are powered with de Havilland *Gipsy* engines (engines which today are giving 1500 hours between overhauls), and all have de Havilland variable-pitch propellers. They are somewhat smaller than the suggested DC-3 replacement, but this is because they were designed to meet operating conditions unlike those required of local service aircraft in the United States today. Once in service as feederline transports, they soon had considerable appeal as executive types, and all five have now been adapted for such work and are being flown as company planes.

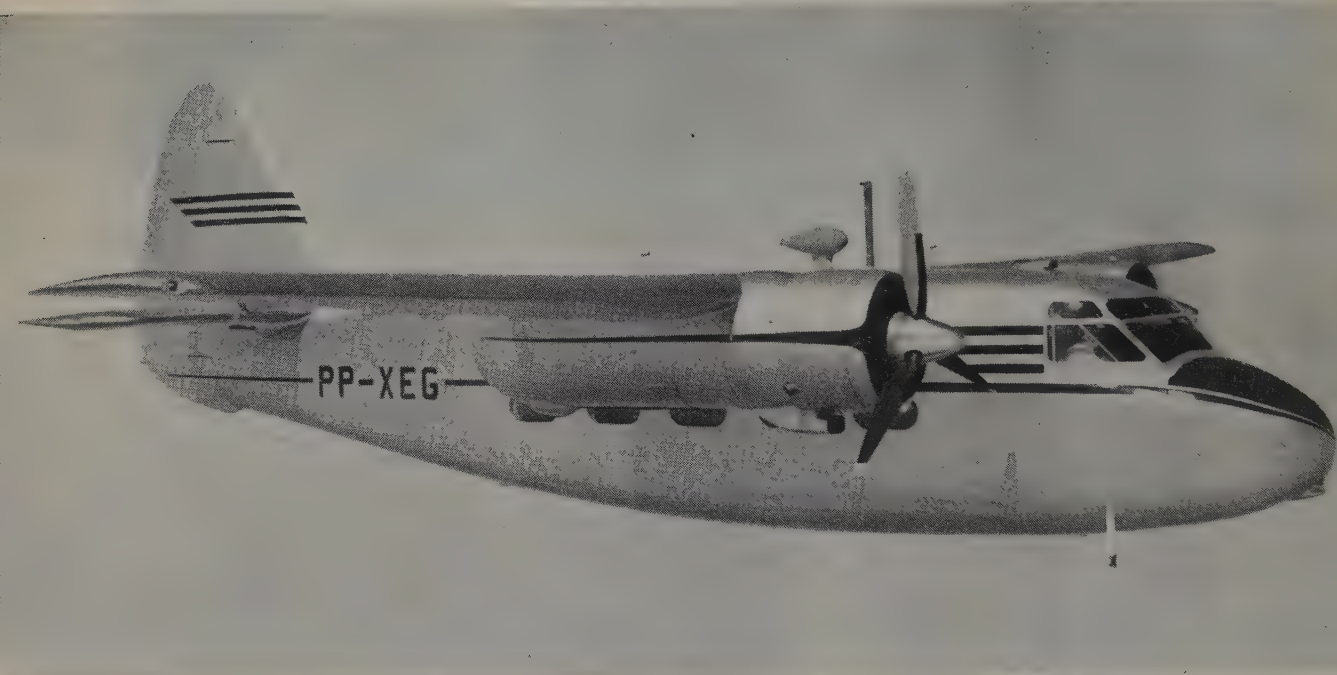
**DE HAVILLAND** *Heron* is four-engine descendant of the *Dove*. Its executive version will have accommodations for 8 passengers; employ a retractable landing gear

**SHORT** *Sealand* is twin-engine amphibian suitable for executive or private ownership. As an executive ship, it seats 4 or 5 in reclining chairs; has top speed of 185





**PERCIVAL** *Prince Mk. III* is presently undergoing certification for its ICAO Transport Class A classification. Feature of Prince is accessibility to its Leonides engine via hinged panels (left). Note the starboard-engine prop feathered in photo below. One-engine-out rate of climb is 340 fpm



Before discussing them in detail, it is worth while to see how the demand for the executive-type transport grew up in the United States, and why it has been so successful and, more important still, what will have to be done if this movement is to retain its present popularity and strength. The size of the country, the spread of its industrial centers, the number of airports and the excellence of the navigational facilities have made executive-owner operation both necessary and reliable. An excess of war-time aircraft and pilots gave an easily tapped source of supply, while particular clauses in the Income Tax laws offered the financial urge. It was all very simple. But there is another and less ingenuous side to this picture. The very circumstances that built up a big executive-transport market have also tended

to delay the technical development of the type and, therefore, its economic development as well. Many of the machines in use today are not only semi-obsolete, but more serious still, they are expensive to operate, and in this aspect compare unfavorably with other methods of air or surface transport. It would seem that this isn't altogether the American aircraft manufacturers' fault, for although certain firms that had types suitable for executive work under consideration between 1946 and 1948 failed to appreciate the potential market, they got little encouragement. Consequently, the executive-transport movement today needs aircraft which will keep it on a sound economic basis—and this cannot happen as long as it relies on the surplus aircraft market and the caprice of the Income Tax law. Should there

be a business recession or a fluctuation in the economy of the country, uneconomical executive transports might be the first to suffer. This in turn would mean a reduction in the size of the over-all executive fleet. The introduction of more economical aircraft, therefore, whether American or British, could go a long way towards preventing such a situation. In the long run, an economy drive now might pay handsome dividends later.

In considering the British executive transports that are available and suitable for the American market, however, there is one very important question that is always asked: "Will the Civil Aeronautics Authority issue an American certificate of airworthiness to a British-built piston-engined aircraft?"

The answer is that they will, provided the British aircraft holds a full and up to date British Certificate of Airworthiness as issued by the British Air Registration Board, and the Air Registration Board advises the CAA that the aircraft in question meets the necessary requirements. Once this confirmation is received, and subject to any flight checks or local limitations the CAA may require, an American certificate can be issued.

#### **de Havilland Dove**

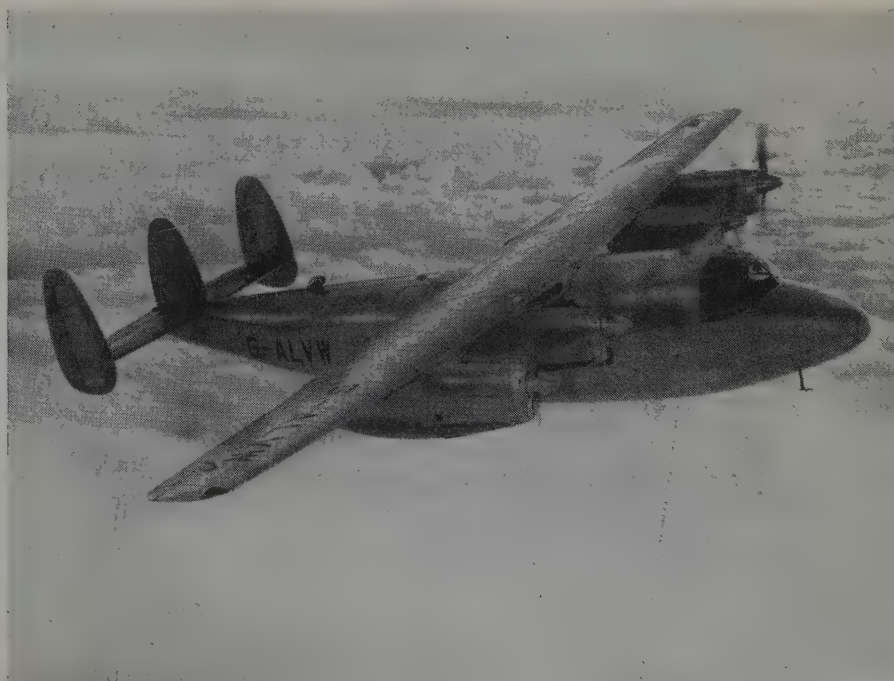
Taking these executive-type British aircraft in their manufacturer's alphabetical order, the *Dove* and *Heron* come first. Their details are already well-known in the States. Both are completely private ventures. The *Dove* first flew in September, 1945, and was an immediate success. Over 330 have been built. Some 30 of them are already in use in

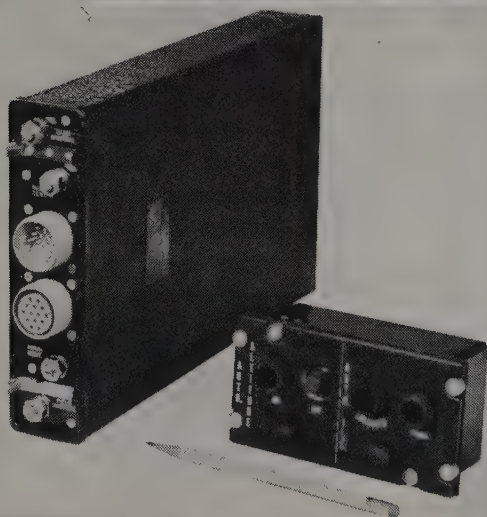
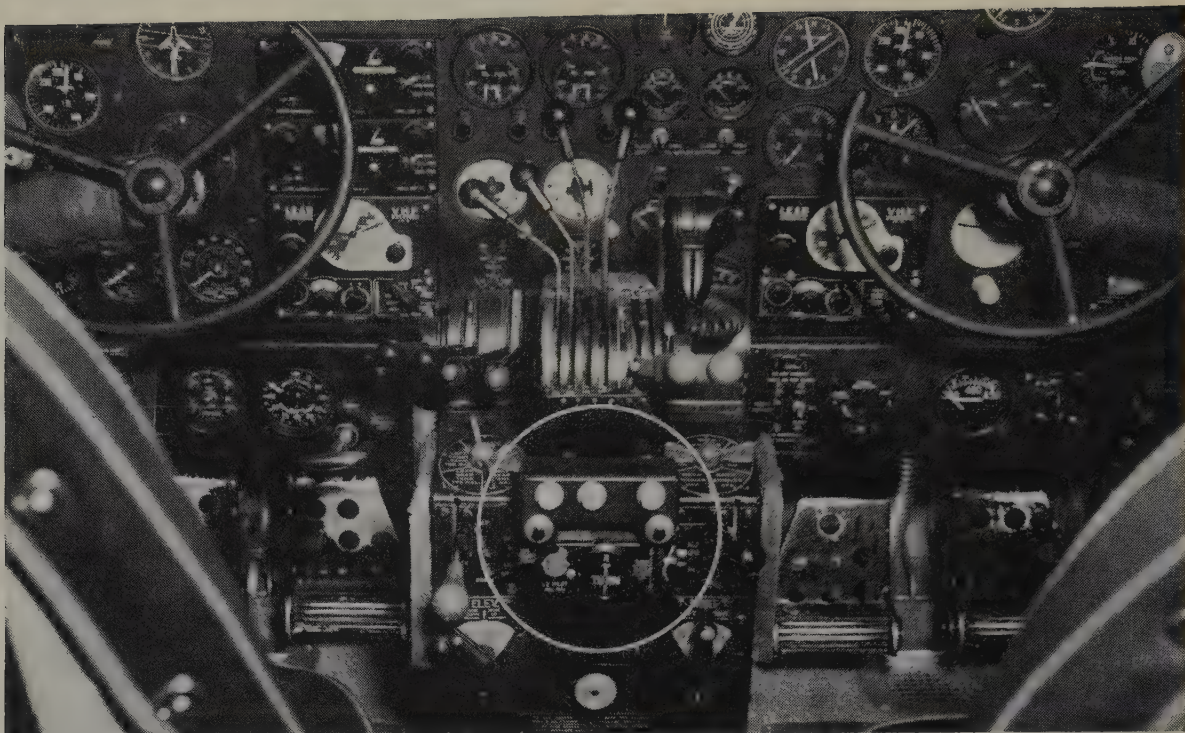
this country, and in order to give owners the best possible service, arrangements have been made for Pacific Airmotive Corporation to handle de Havilland *Gipsy* engine and *Dove* airframe overhauls.

Adequate servicing facilities have been installed at Linden Airport, New Jersey, where PAC carries a large supply of spares and where de Havilland service representatives are based. These facilities are likely to be extended to the West Coast, and there are area distributors for the *Dove* located elsewhere throughout the country.

The aircraft itself appeals to the executive owner, not only because of its very economic operation but because of its comfort and quietness and the excellent view through its 2-ft. 2-in. x 1-ft. 3-in. windows. The usual layout for the executive model is four large armchairs located in pairs opposite one another and with a table between, and a single seat situated forward. This allows ample cabin space, with a toilet and wash basin aft. There are two large baggage or cargo compartments, one behind the cabin and one in the nose. Extreme ease of maintenance is another good point, particularly the quickly removable cowlings, handy location of the refueling points and the position of the battery, radio, control runs, etc. The writer has flown one of these aircraft all over North America and can testify to its excellent performance and handling characteristics under all conditions. Even without extra tanks its range is adequate. On the aircraft flown it was the custom to cruise at approximately 55% of take-off power which gave a true cruising speed of 172 mph at 7,000 feet with a fuel consumption of just under 30 U.S. (Continued on page 54)

**HANDLEY PAGE** *Marathon* is another executive aircraft possibility from England. As a corporate plane, its cabin could accommodate 10 or 12. It is powered by 4 *Gipsy Queen* engines; cruises at 157 mph





**AUTOPILOT**, the Lear F-5, is shown here (above) installed on controls pedestal (within circle below throttles) of Lockheed Lodestar. Cost of the F-5 is \$13,750, less Automatic Coupler, cost of installation

**AUTOMATIC APPROACH COUPLER** of F-5 would permit airline ceilings to be safely lowered to 100 feet with 1/16-mile visibility, according to Mr. Lear

**AUTOMATIC PILOT** components (below) are Control unit: Amplifier, two Gyros, Plug-in Servo Channels, Plug-in Calibrating box; three Servo Actuators, and (to left of slide rule) the pilot's Controller



# AUTOMATIC FLIGHT

## with the F-5

by Jim Fahnestock



**BILL LEAR** flew a *Lodestar* equipped with an F-5 in demonstration of the new Lear Approach Coupler

Today as the shiny new F-86's, F-84's and F-89's roll out of their respective birthplaces they are 79 pounds heavier, but the job of the pilots who will eventually fly them is much lighter. Most of this extra weight is contained in a 10 x 8 x 13 inch black box tucked away in a seldom-seen part of the plane. Wires and cables connect this box to the other black boxes hidden strategically around the airframe. The newcomer is, of course, the Lear F-5 autopilot.

The pro's and con's of automatic flight have been hashed over hundreds of times. The most impressive argument on the pro side is an in-the-air demonstration, such as we were given in Bill Lear's F-5 equipped *Lodestar* at LaGuardia last month. An hour flight around New York, and in and out of Idlewild several times, convinced us beyond a doubt that Bill Lear's winning of last year's Collier Trophy was more than just a tribute to a man and his ingenuity. It served also as a milestone in aviation progress that should have a telling effect on transportation history.

For all practical purposes, after we left the ground at LaGuardia, the wheel and rudder pedals might just as well have been stowed away in the baggage compartment—except for brief moments when we wanted to bring ourselves back down to earth in the literary sense and recall the good old days (or were they?).

Bill Lear ran the show from front left and put the F-5 through its paces. We climbed straight as an arrow away from the field at about 900 fpm until we reached 2,000 feet, at which time we pushed the Automatic Altitude Control button. The autopilot's response to this simple move was almost unbelievably smooth and positive. The nose dropped gracefully, and in a few seconds we were cruising along at exactly 2,000—in fact, if we hadn't seen it move, we'd have sworn the needle was actually painted on the altimeter dial at the 2,000-foot mark.

A twist of the *Turn* knob set us in a smooth bank to the south and a few seconds later another twist brought us out with equal smoothness on a course down the Jersey side of the Hudson—still exactly at 2,000 feet, though by this time we had learned to ignore the manual controls that once seemed so indispensable.

At any time we could easily overpower the F-5 and turn, climb and dive at will. But let go of the controls, and we were back in our chosen groove heading out over Staten (*Continued on page 53*)

# maintenance of the DC-3

**Owners and operators of executive DC-3's are offered**

**time and money saving tips on aircraft maintenance**

When a pilot settles in the cockpit of a Douglas DC-3 today and prepares for take-off, he is handling a ship that bears only structural similarity to the original designed and produced by the manufacturer.

In 12 years of operation for Chicago & Southern Air Lines, the DC-3 has undergone major engineering changes with several of its systems improved for better operation and maintenance of the ship.

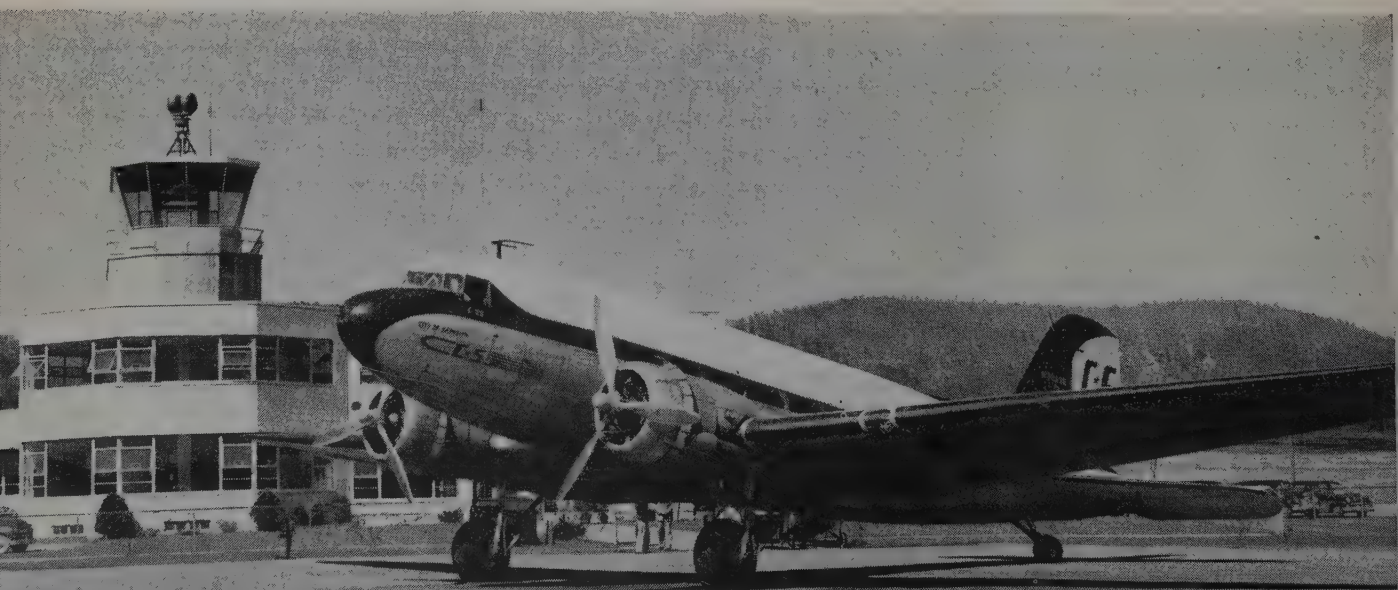
The 3's have established some impressive records for C&S—approximately 55 million miles flown from May 1, 1940 through April, 1952 without a single fatal accident. C&S has operated a fleet of 12 DC-3's more than 100,000 engine hours without a single engine failure. Flight time between engine overhaul on the C&S DC-3's is one of the highest in the industry—1,450 hours.

Strict maintenance standards demanded by the CAA form the basis of scheduled operators' maintenance and operation, but C&S, like most scheduled carriers, goes a step further than the law requires to insure safety. In the process of eliminating unnecessary steps in maintenance of the DC-3, and in working out the best possible system of checking the condition of the plane, C&S has developed many

**by W. T. Arthur**

*Vice Pres., Operations,  
C&S Air Lines*

*As told to W. C. Stone*



time and money saving devices that it gladly shares with all operators of this type equipment.

### Major Improvements in DC-3's

Important engineering changes have been developed by C&S and incorporated in its fleet of DC-3's. These improvements have been shared with DC-3 operators throughout the industry, and several of the changes have been made by other users of this equipment. In brief, these include:

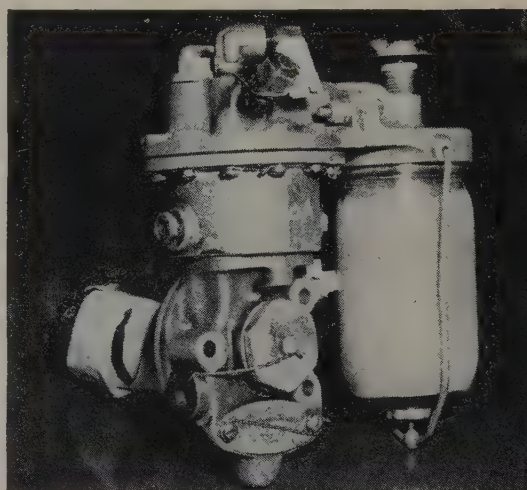
**Centralized Radio-Control Panel**—C&S designed and had installed before the delivery of the first DC-3, a centralized radio-control panel which is mounted in the top of the cockpit over the vee of the windshield. The units were built by Bendix Radio. This control panel places all radio controls within easy reach of either pilot. The assembly is a quick-change type, with plug connections so that spare units can be installed and periodic service rendered to the control unit.

**Oil-Temperature Regulation**—C&S developed an improved oil-temperature regulator mounting: an adaptor coupling which permits this unit to be mounted directly on the engine oil pump, eliminating two oil lines, four hose couplings, eight hose clamps and four hose connection fittings with a total weight reduction of 1.4 pounds per engine installation. This has been standardized by Douglas Aircraft and is used on all DC-3's with the G-202A (702C9G1) engine installations.

**Tires Recapped**—The C&S engineering department has drastically cut tire replacement costs by recapping DC-3 tires by the Hawkinson method, recapping only the crown. The sidewalls are not adversely affected by heat during the recapping process, keeping them fresh and prolonging their life. C&S has recapped tires as many as seven times and as yet has not established a maximum number of times a tire may be recapped. When the tires are sufficiently worn, C&S turns them over to the Shelby Tire Company in Memphis, and the tire is either recapped or rejected. In case of rejection, C&S is informed of the reason, so that a strict control may be kept for tire



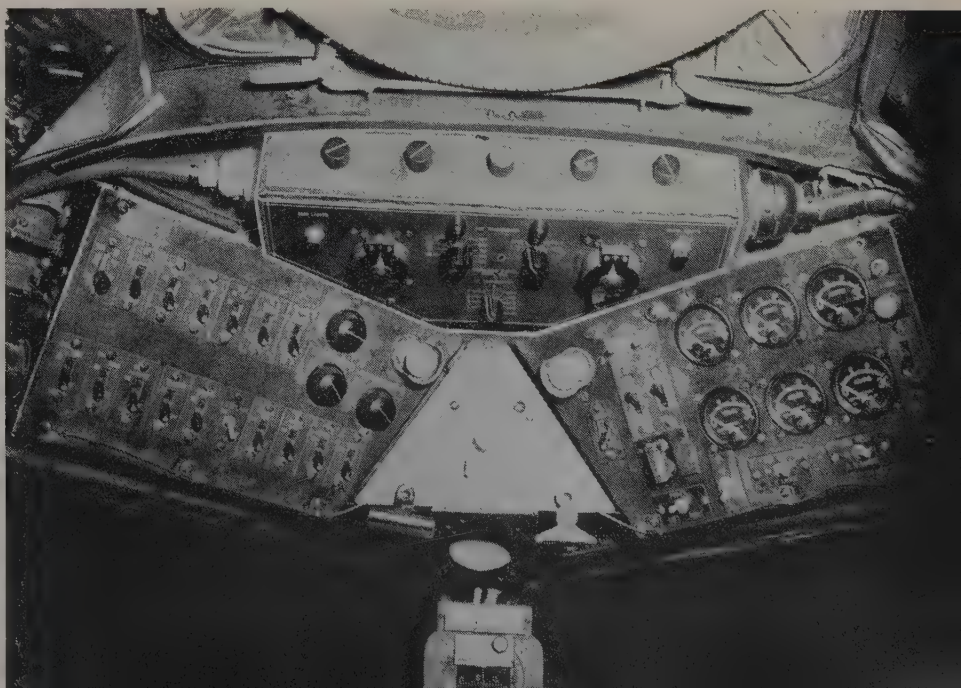
**TIRES** recapped by Hawkinson method have longer life. C&S has had DC-3 tires recapped 7 times

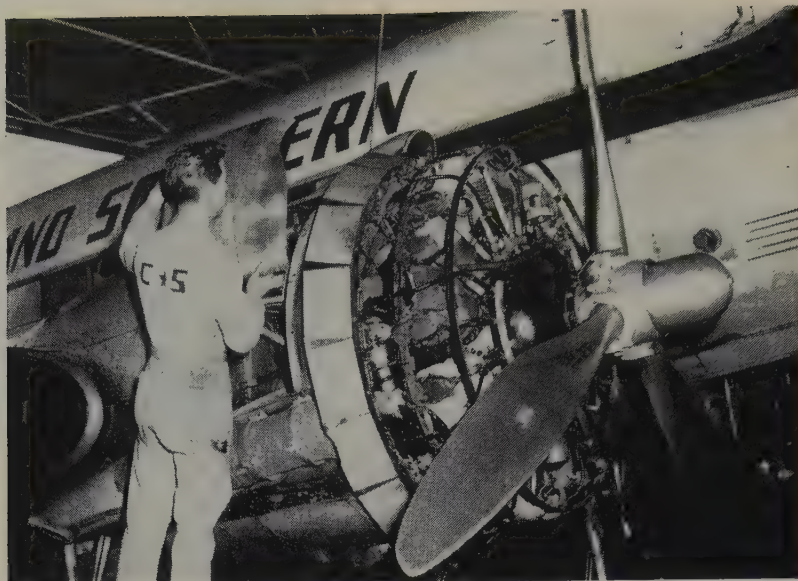


**AIR PUMP**, designed by C&S, provides simple air system for supercharging ignition harnesses

**CHICAGO & SOUTHERN Air Lines** has operated fleet of 12 DC-3's for 12 years. DC-3's have flown 55 million miles; not one has ever been involved in a fatal accident, C&S' base is at Memphis

**CENTRALIZED** radio-control panel is built into DC-3 in top of the cockpit over the vee of the windshield. This places all radio controls within easy reach of pilots. Assembly is quick-change type





**ENGINES** are uncowed for more accurate check after 75 hours in flight operation. Two mechs should be able to easily complete an accurate inspection in an 8-hour period

failure. This process has reduced the cost of tires for each landing to 24 cents.

**Air System**—An air pump designed several years ago by R. L. Anderson, superintendent of engineering for C&S, has made available the simplest possible air system for supercharging ignition harnesses. This air pump incorporates pressure regulation for the system desiccant cartridge to dry the air pumped into the harness; includes variable displacement, so that the air pump automatically increases volume capacity to maintain ignition harness pressure should a leak occur in the ignition shield system while in flight. This is now manufactured by Scintilla Magneto Division of Bendix Aviation Corporation.

**Magneto Ventilation**—Over a period of years of close observation, it was noted that a large percentage of magneto troubles, especially burned and oxidized breaker points, was directly caused by the oil vapor-fouled atmosphere present in the magneto shield housing interior. On the theory that a positive circulation of clean air through the magneto housing would remove and eliminate this oil vapor-fouled atmosphere, and correct magneto difficulties, C&S engineering designed and developed a simple air system: air is taken from the standard magneto cooling blast tube and exhausted to the engine accessory compartment. Positive circulation is created by the positive pressure in the air-blast tube at the inlet point and the negative pressure present in the engine accessory compartment at the exhaust opening. Air passages were designed to insure 18 to 20 cubic feet of clean free air per hour passing through the magneto housing. Since instal-

lation was made on C&S equipment, breaker points which formerly required cleaning and adjusting after 150 hours of operation, now are operated full engine-overhaul periods without inspection or service of any kind.

**Quick-Change Flight Panel**—To insure more safe operation, C&S considered it advisable to check the calibration of all the instruments in the flight group after each 150 hours of flight operation. There are six instruments in this group: directional gyro, gyro horizon, turn-and-bank indicator, airspeed indicator, altimeter and rate of climb.

A quick-change installation was developed so that the six instruments in this group are changed as one unit on a panel assembly, with a quick disconnect manifold for all plumbing and electrical connections. With this set-up, it is possible to change the complete flight group in seven to 10 minutes, and with the manifold connection block, it is humanly impossible to get any of these instruments improperly connected.

**Wing-Ice Light**—At the suggestion of a C&S pilot, a light was installed on the outboard side of the engine nacelle, a little ahead of and above the leading edge of the wing, which directs its beam out along the wing and makes it possible for the pilot to easily judge the icing condition during night flights. This installation is now a standard production item.

Detailed explanations of all improvements listed here are available to executive-plane operators. A letter to C&S engineering department, Memphis, Tennessee, requesting engineering data will bring corporate DC-3 operators the necessary information.

## Periodic Checks Important

As required by the CAA, all DC-3 passenger ships are checked daily. Essentially a visual going-over, this can be accomplished by a one-man maintenance-inspection crew. One of the most important steps in this daily check is changing and cleaning of the oil (Cuno) strainer. It has been C&S' experience that the extra work and expense involved in pulling the cuno daily is worth it in fewer engine failures, fewer cylinder changes and piston failures. Usually the identification of metal bits caught in the cuno indicate the defective part, which could render that part completely non-repairable were it allowed to continue in its condition, if not develop into an emergency when the plane is in the air under full power.

Another important function in the daily inspection is checking the pitot heaters. This installation, an engineering development in cooperation with the Pioneer Instrument Division of Bendix Aviation, consists of electrically heated pitot heads located on the nose of the ship to perform a de-icing function on the airspeed system, assuring the proper airspeed indication when flying in any kind of weather. Formerly, the airspeed system was subject to malfunction in extreme precipitation and icing conditions. In heavy rain, water accumulated in the pitot plumbing, and the pilot could not depend on the airspeed indicators.

This improved airspeed system has been adopted by Delta, Alaska, Canadian Pacific, All American.

## DC-3 Inspection

A DC-3 operated less frequently than equipment used by a scheduled carrier need not undergo this

inspection daily, but certainly should be inspected following a definite procedure before every flight.

Visual inspection of all fuselage skin for damage or wrinkles. A wrinkle is a sign of structural failure and should be investigated, and a damaged section should be repaired or replaced. The wing skin should be checked for damage; center section skin for general condition; ailerons for condition and all inspection doors closed.

Check: stabilizer and fin skin, elevators and rudder for condition and signs of damage; tires, condition and inflation; wheels for leaking brake seals and structural failure. The landing gear structure and linkage should be inspected for cracks and safetying; the latch system should be locked and spade in locked position at retract strut in wheel well; Oleo struts for leaks and height; Landing Oleos 6 inch from axle to bottom of packing nut on Oleo, tail Oleo 8 inch from top of packing nut to center of air valve.

Drain all fuel-tank sumps, C-3 strainers in a glass bottle and check for water. If any amount of water is found, a further investigation is necessary.

Visual inspection of batteries and their racks for condition; a hydrometer check of each cell with minimum hydrometer reading of 1240 is permissible. The average reading of cells should be noted.

It is important to look for signs of fuel and oil leaks; fuel leaks are indicated by deposit of blue stain from gasoline; fill oil tanks to 18 gallons and check tank caps for security; record oil added in each oil tank.

Nacelles, furnishings, oil tanks (left and right): Check nacelle skin for dents and cracks, check inside structure (*Continued on page 56*)

**WING-ICE LIGHT**, installed on outboard side of engine nacelle, makes it possible for pilot to easily judge icing condition on night flights



# SKYWAYS FOR BUSINESS

NEWS NOTES OF PILOTS, PLANE OWNERS OPERATING AIRCRAFT IN THE INTEREST OF BUSINESS



**NEWEST EXECUTIVE TRANSPORT** to go into operation for Morrison-Knudsen Co., Inc., is this Aero Commander. Morrison-Knudsen Co. belongs to Corporation Aircraft Owners Association.

## New Hangar at Westchester, N.Y. for Corporate Plane Maintenance

*New York, N. Y.* To meet the growing needs of civil aviation in the New York area, one of the largest hangars in this section of the country will soon be constructed at Westchester County Airport.

The Flying Tiger Line, one of the country's three largest scheduled air cargo firms, will occupy two-thirds of the hangar. In addition to using the new facilities for the operation of its own air freight system, the Flying Tiger Line will provide storage and maintenance service for corporate and executive aircraft. The remaining one-third of the hangar space already has been rented to corporate tenants.

Sinclair Oil, which bases a number of aircraft in the New York area, will occupy space; the Johns-Manville Corporation, U.S. Steel and Olin Industries will occupy the remainder of the one-third space.

## Executive B-25 on 18,000-Mile Business Trip to Europe, Africa

*Jackson, Mich.* Arthur D. Knapp, owner of Mechanical Products, Inc., has scheduled an 18,000-mile business trip to Europe in his B-25 executive transport. Purpose of the trip, which is to cover England, France, Germany, Sweden, Italy, South Africa and South America, is to set up manufacturing-under-license arrangements in those countries of one of the company's new products, a circuit

breaker for both commercial and household use.

In preparation for this extended business flight, Mr. Knapp has had \$30,000 worth of new electronic navigation instruments installed in the B-25. Included are a Bendix PB-10 automatic pilot and automatic approach coupler, with throttle servos, trim tab servos, and a complete NA-3 Bendix navigation system, with maximum in-

strumentation including omni-magnetic, omni-bearing indicator and radio magnetic indicator. The work was done at Grand Central Aircraft Co., Glendale, Calif.

Pilot on the long flight will be Lloyd Zantop, with Mr. Knapp himself serving as copilot. Other company officials also are scheduled to be aboard the executive transport which is equipped to carry 1,350 gallons of fuel and has a range of about 2400 miles.

According to Mr. Knapp, the B-25 is flown approximately 500 hours a year on company business, and he is seeking a second aircraft of a similar type because of the company's increased activities.

Mechanical Products Inc. is a member of Corporation Aircraft Owners Association.

## Executive Plane Struck by Lightning on Business Trip

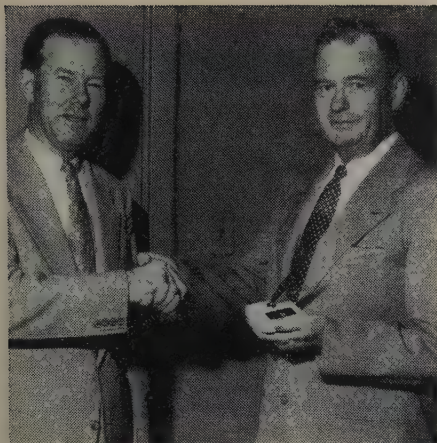
*Minneapolis, Minn.* A Twin Beech, owned by the Burch Construction Company of Great Falls, Montana, was struck by lightning while flying through a thunderhead in the Rocky Mountains west of Great Falls. The lightning burned holes in the fuselage and one wing and destroyed radio equipment.

"It sounded as if a stick of dynamite exploded in the cabin," pilot Bob Finklea reported to maintenance men at Gopher Aeronautical Corporation, Wold Chamberlain Airport, where the plane was taken for repairs.

The lightning bolt tore four holes about the size of a quarter in the top of the

**DE HAVILLAND DOVE** is enjoying increased popularity in this country as an executive transport. Pacific Airmotive has been named Dove distributor by de Havilland Aircraft Co., Ltd.





**PILOT L. E. GRAY** (right) was presented desk set by Continental Oil Pres. McCollum for five million safe miles flown by Continental.

fuselage, burned a hole in the trailing edge of the left wing flap, knocked out two radio receivers and three transmitters, and damaged the voltage regulators in the generator. No one was injured.

Veteran airmen at Wold Chamberlain said it was the first time they had heard of lightning burning holes in an airplane.

Technicians from the University of Minnesota, who have been conducting extensive tests into the effects of lightning on aircraft, spent several hours inspecting the Twin Beech before it was put into the shop at Gopher Aeronautical. The plane was cleared through the shops in five days and sent back to its Great Falls base. It is now back in executive operation.

## NATCC Asks Operators To Stop Low Flights Between LG, Int'l

**New York, N. Y.** Operators shuttling between LaGuardia and International Airports have been asked by the National Air Transport Coordinating Committee to eliminate low flights between the fields as a step toward reducing aircraft noise annoyance to residents of Long Island communities.

Citing reports received at its New York Complaint Center, NATCC said that low flights between airports are a disturbing factor in a number of communities, and requests aircraft operators to:

1. Attain a cruising altitude not less than 1200 feet, weather permitting, as rapidly as possible after leaving either airport.
2. Maintain cruise altitude of not less than 1200 feet as long as possible before beginning descent to the destination airport.
3. Utilize techniques to eliminate aircraft noises to the maximum extent consistent with safety.
4. Make approaches and turns over water and open areas whenever possible.

A spokesman for the industry committee said limited operations currently in effect at Newark Airport are resulting in a substantial number of planes having to be ferried between the two Long Island fields. This increase in ferry operations, coupled with the Complaint Center reports, prompted the NATCC request regarding shuttle operations.

## ...in the Corporate Hangar

Pilot Max Jobst brought Indiana Gear's Twin Beech into the Roscoe Turner Aeronautical hangar for 100-hour inspection, a new paint job and installation of de-icer boots, autopilot, interphone system, complete ARC 17, BC453 Range Receiver, complete ARC Omni 15B and R89 Glide Path. Upon completion of the work, Max flew the ship to Alaska.

Don Brady and Grant Ruth, pilot and copilot of one of the Morrison-Knudsen DC-3's, flew the ship to AiResearch for an 8,000-hour overhaul and installation of a new executive interior. Morrison-Knudsen, members of CAO, operate several DC-3's, an Aero Commander and a Convair LB-30. Two of the DC-3's, including the one in the hangar for overhaul, are based at Boise, Idaho.

Vaughn Monroe Productions, Inc., of Boston, Mass., has bought a Grumman *Widgeon* through Powers & George, aircraft brokers in New York. The *Widgeon* formerly was owned by Indamer Corp. Orchestra leader Vaughn Monroe plans to use the airplane for traveling with his orchestra.

George Lenderman and Bob McAtee brought RCA's new DC-3 to Remmert-Werner for its initial 100-hour inspection. Beldex Corp., an affiliate of Remmert-Werner, did the original conversion work on the executive Douglas.

A complete overhaul on a *Lodestar* sold by L.B.S. Aircraft Corp., to Johns-Manville Corp., of New York, has added speed, range and economy to the airplane. Power was stepped up to 1,350 hp with Pratt & Whitney R1830-75 engines, and its long-range cruising speed was upped from 185 mph to 210 mph. L.B.S. added fuel tanks and latest type props.

Rowan Drilling Company's Grumman *Widgeon* is undergoing a complete overhaul at Southwest Airmotive. Based at Fort Worth, the *Widgeon's* pilot is Mel W. Missall. The Rowan Company holds a membership in CAO.

Mississippi River Fuel Corp.'s *Lodestar* is in the shop at Remmert-Werner for additional radio equipment.

Two B-26's belonging to Tennessee Gas and Transmission Co., Houston, Texas, are back in service after complete overhauls and installation of new executive interiors at AiResearch. Tony Zuma and Sid Pourchot, Jr. supervised the work for TGT.

A. L. Dougherty Company of Indianapolis has bought a Lockheed 12 from Powers & George. The ship formerly was owned by Cities Service Corporation, New York. The airplane will be used in connection with the construction business of the A. L. Dougherty Company. Lloyd Decker is the pilot.

Bart Stevenson, pilot for Green Construction Co., Dunbarton, S.C., recently brought the company Twin Beech into the Roscoe Turner Aeronautical hangar for 1,000-hour inspection.

Louis Perini, owner of the Boston Braves and president of B. Perini & Sons Construction Co., recently bought a Douglas DC-3 from Remmert-Werner.

The *Lodestar* belonging to the N.Y. *Herald Tribune* is in the L.B.S. shops at Miami for minor repairs to the gas tank, alterations in the fuel system and installation of a Sperry Zero Reader. Pilot Lloyd Rondeau flew the ship down from New York.

John Franks of Indianapolis has had an autopilot installed in his Twin Beech and a new paint job. Work was done at Roscoe Turner Aeronautical.

Great Lakes Carbon Corporation's DC-3 is back in service after a 1,000-hour overhaul and a new paint job by Remmert-Werner. Also back in service after a 1,000-hour check is International Harvester's DC-3. Both companies are members of Corporation Aircraft Owners Association.



# CAOA report

CORPORATION AIRCRAFT OWNERS ASSOCIATION, INC.

Corporation Aircraft Owners Association is a non-profit organization designed to promote the aviation interests of the members firms, to protect those interests from discriminating legislation by Federal, State or Municipal agencies, to enable corporation aircraft owners to be represented as a united front in all matters where organized action is necessary to bring about improvements in aircraft equipment and service, and to further the cause of safety and economy of operation. CAO headquarters are located at 1029 Vermont Ave., N. W. Washington 5, D.C. Phone: National 0804.

## Command Performance

On August 7 a letter was sent to all members of CAO advising them of the resignation of Herbert O. Fisher, Executive Director of CAO. Mr. Fisher's resignation came as the result of a request to CAO by Mr. Fred M. Glass, Director of Aviation for the Port of New York Authority that Mr. Fisher be released by CAO so that he could take over a position of great importance to the Port Authority and to do a job necessary and vital to the continuance of air-transport operations in the Metropolitan New York area.

The following letters will serve to further detail the factors leading to CAO's release of Mr. Fisher:

July 17, 1952

Dear Cole:

I am writing you this letter to confirm our telephone conversation of Monday, July 7, 1952, with respect to the availability and release of Herbert O. Fisher, Executive Director of CAO, for the position of Chief of the Aviation Development Division of the Port of New York Authority which position encompasses a particular requirement of extreme importance.

As head of the Corporation Aircraft owners Association, Inc., you are extremely cognizant of the unfortunate and unprecedented series of incidents which have occurred in the field of air transportation locally with a resulting widespread and detrimental impact on air traffic of a critical nature from the general public's point of view. As I outlined in our conversation, these serious aviation developments which have occurred during the past year in the metropolitan area are precedent setting, and by their very nature, reflect the tremendous importance of the problem to the entire aviation industry.

It goes without saying that the discharge of such responsibilities by any division head on behalf of the Port Authority requires a comprehensive knowledge of aircraft and

airport operations, a sense of public relations, an ability to deal with the public, and a recognized standing throughout the aviation industry. I am sure you agree with me that Herb Fisher is well qualified in all of these counts.

Because, however, of the considerations above enumerated, I believe that Herb's service could not be better utilized to his own advantage or to the industry's than in the position with the Port Authority that I have above described in a rather general manner. It was for these reasons that I advise you of my sincere hope that he can be released by you and the other Directors of CAO for the assumption of these various important duties with the Authority.

We all recognize that Herb, like in his past two positions, has acquired a very deep sense of loyalty to CAO and has indicated to me a strong desire to remain active in furthering the good work of CAO.

Sincerely,  
/s/ Fred M. Glass

The Board of Directors of CAO considered Mr. Glass' letter at the July meeting of the Board in New York City, and the following letter was drafted for mailing to the entire CAO membership:

August 7, 1952

To CAO members and friends:-

It is with regret that we announce that Herbert O. Fisher, our Executive Director, is resigning from CAO to accept the posi-

tion as Chief of the Aviation Development Division of the Port of New York Authority becoming effective as of the above date.

Mr. Fred M. Glass, Director of Aviation for the Port of New York Authority, contacted the writer on July 7, 1952 with respect to the availability and release of Mr. Fisher for this position with the Authority which we know encompasses a particular requirement of extreme importance to civil aviation.

Due to the splendid manner in which the Port Authority approached us for his release and the amicable arrangement of the transaction, it was agreed by our Board of Directors that because of the importance of this new assignment and the immediate advantages to Mr. Fisher, his release was approved.

At the present time, applications are being accepted for a new Executive Director and we anticipate a suitable replacement will be made in the very near future.

Mr. Fisher has acquired a very deep interest in the future of CAO and corporate flying and has indicated his desire to assist the Association in any way possible, further the growth of this important segment of aviation.

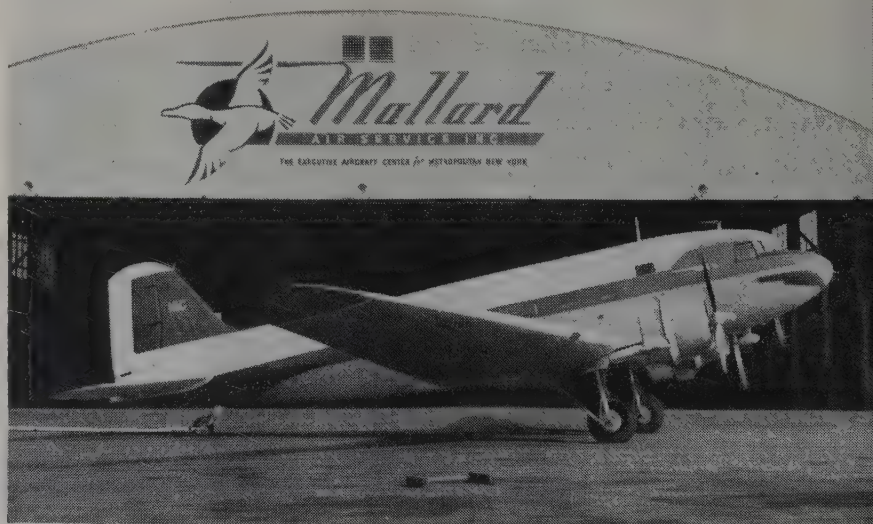
We wish Herb every success possible in his new undertaking.

Yours very sincerely,  
/s/ Cole H. Morrow  
Chairman of the Board

## CAOA Safety Plan Adopted

A plan has been approved to provide additional safety to planes flying across Lake Michigan by the use of radar and Very High Frequency direction finding equipment. This plan was proposed by the Corporation Aircraft Owners Association last February through the efforts of Cole H. Morrow, Chairman of the CAO board.

Due to the foresight of CAO and the splendid cooperation of Charles F. Horn, Administrator of CAA, and the facilities of USAF Air Defense Command, U.S. Navy and U.S. Coast Guard, this will provide tremendous assist to pilots in trouble while flying over Lake Michigan through the use



BRISTOL-MYERS CO. of Hillside, N.J. owns and operates an executive DC-3 based at Teterboro. Chief Pilot is David L. Flannery. Bristol-Meyers was one of the founders of Association

of long-range military radar equipment.

These long-range radar installations which the military are making available for civilian search and rescue is in addition to the lake reporting service established two years ago by the CAA to assist pilots in trouble over Lake Michigan.

1. By calling a CAA ground communications station by VHF (very high frequency) of HF (high frequency) radio and stating the nature of the emergency and the assistance desired, the caller will alert all appropriate facilities in the area. The CAA will inform the pilot of the action taken and maintain contact with him for the duration of the emergency.

2. In extreme emergencies the pilot may broadcast "MAYDAY" on the emergency frequency of 121.5 mc and make direct contact with a military facility on this frequency.

3. If the aircraft has HF instead of VHF transmitting equipment, the pilot should make his emergency "MAYDAY" call to a CAA ground station, which will notify the appropriate agency of the services desired.

Pilots who desire to use this service should fly over Lake Michigan at altitudes above 5,000 feet to assure complete coverage during their flight over the lake.

This is just another typical service rendered by your CAO.

#### **The Executive Pilot**

An executive pilot runs a one-man airline. He is his own meteorologist, aeronautical engineer, hydraulic engineer, electronics expert, dispatcher, navigator and superintendent of maintenance.

He is a man of many decisions. His decisions involve his own life, the lives of his passengers and many millions of dollars. He makes these decisions at 200 mph with a 300-mph brain. He makes them without the help of a Board of Directors. He has to be right every time.

He has to be a diplomat and a salesman because he must fly the passengers as well as the airplane. He is the only man on the payroll who can overrule the Chairman of the Board. In flight, he is the Chairman of the Board.

All this vast technical knowledge and skill and diplomatic ability is useless unless he has common sense or good judgment, or whatever you want to call it. We call this ability to think straight in an emergency the "X" factor. It is what keeps him alive. It is the difference between a long gray beard and a long gray tombstone.

Pilots who have all these qualities are the most highly trained professional men in the history of the human race. Never before have mortal men shouldered such tremendous responsibilities.

How are they doing? Let us look at the record of cold hard facts which insurance men call statistics. Your grandfather's buggy killed 30 people per one hundred million passenger miles. Your dad's auto killed about 3. Your plane is killing about one passenger per one hundred million passenger miles. One hundred million miles is 71 years of non-stop flying in a DC-3. Human beings are never perfect, but an old executive pilot comes far closer to perfection than most of us.

The above was submitted by CAO member, E. L. Stevenson, of the Associated Aviation Underwriters, Chicago, Illinois.

#### **Use of Wright-Patterson Air Force Base**

CAOA headquarters has had many inquiries from corporate owners for the procedure to be used by all private and executive aircraft operators desiring to use the flying field facilities of Wright-Patterson Air Force Base.

Following is the official procedure to be used:

"1. They must be contractors to the government transacting official business with the government. Because of the fact that the Dayton Municipal Airport is located so conveniently to the City of Dayton and provides adequate airfield facilities, local interpretation has been made that the government agencies indicated in the foregoing sentence must be located immediately on Wright-Patterson Air Force Base.

2. Those operators who qualify under subparagraph "1" above, should submit a request to the Commanding Officer, Wright-Patterson Air Force Base, Ohio, Attn: Base Flight Operations Branch (EWE), for the use of the flying field facilities at Wright-Patterson Air Force Base. This request should contain their desire to use the flying field facilities and the agency or agencies with whom they will conduct business. The Commanding Officers, Wright-Patterson Air Force Base will, upon substantiation with the agencies named, forward to operators, copies of Air Force Forms 180 and 181 to be executed by the operator.

3. The above forms when properly executed should be returned to the Commanding Officer, Wright-Patterson Air Force Base, Ohio, Attn: Base Flight Operations Branch (EWE). After authentication and approval by the Commanding Officer, Wright-Patterson Air Force Base, copies of these forms will be returned to the requesting agency as their authority for the utilization of the flying field facilities at Wright-Patterson Air Force Base.

4. This agreement can be made for a six months' duration, or for a one-time landing, depending upon the requirements of the individual operators in connection with their business with activities located at Wright-Patterson Air Force Base. The Commanding Officer, Wright-Patterson Air Force Base, will automatically notify all operators prior to the expiration of a six months' agreement so that extensions may be granted if required.

5. Provisions are made in the regulations prohibiting the sale of gasoline, oil and normal servicing facilities. Therefore, it is requested that your members be informed to plan their flights in such a manner that no servicing will be required when landing at Wright-Patterson Air Force Base."

#### **Hq. Visitors**

The following were recent visitors to CAO headquarters in Washington, D. C.

Stanley C. Smith  
New York Wire Cloth Co.  
New Canaan, Conn.

J. D. Strickland  
Grand Central Aircraft Co.  
Glendale, California

Orville R. Armstrong  
Modern Welding Co.  
Owensboro, Kentucky

Lawrence W. Heinle  
Hiller Helicopters  
Palo Alto, California

Lawrence Lentz  
Champion Sparkplug Co.  
Toledo, Ohio

#### **New Members**

At a recent meeting of the Board of Directors of Corporation Aircraft Owners Association, the following companies were elected to membership.

AMERICAN CYANAMID COMPANY of New York City. The company operates a Grumman *Mallard* and W. E. Shaughnessy is Chief Pilot.

THE BUTLER COMPANY of Chicago, Illinois. The company operates a Twin Beechcraft. Mr. Paul Butler, president, holds a commercial and instrument rating.

CLEVELAND CAP SCREW COMPANY of Cleveland, Ohio, operates a Twin Beechcraft and Wm. E. Jeavons is Chief Pilot.

DEWANEE OIL COMPANY of Philadelphia, Penna. The company operates a de Havilland *Dove* and a Twin Beechcraft. Chief Pilot is Murray S. Wittner.

C. J. LANGENFELDER & SON, INC. of Baltimore, Maryland. The company operates a de Havilland *Dove* and Chief Pilot is Carville C. Evering.

MECHANICAL PRODUCTS, INC. of Jackson, Michigan. The company operates a North American B-25. Mr. Arthur D. Knapp, president, holds a commercial and instrument rating and Mr. Lloyd Zantop, chief pilot, holds an ATR rating.

PONTIAC COACH COMPANY of Drayton Plains, Michigan. The company operates a de Havilland *Dove*. Chief Pilot is John W. Decker.

STORER BROADCASTING COMPANY of Birmingham, Michigan. The company operates a de Havilland *Dove* and Earl J. Johnson is chief pilot.

In addition to these companies elected to regular membership in the Association, two other companies were elected to Associate Membership. They are:

FAIRCHILD ENGINE AND AIRPLANE CORPORATION of Hagerstown, Maryland. They operate a Lockheed *Lodestar*, Twin Beechcraft, Cessna 190 and a Douglas DC-3. Their chief pilot is R. A. Hensen.

REPUBLIC AVIATION CORPORATION of Farmingdale, Long Island, N. Y. The company operates a Douglas DC-3. Chief Pilot is O. P. Hass.

#### **CAOA Calendar and Associated Events**

Sept. 25-26— Annual meeting and forum of CAO in Chicago. Blackstone Hotel

Oct. 9, 10, 11— Cole H. Morrow, Chairman of the Board of Directors for CAO, will be official representative at the International Northwest Aviation Council 16th Annual Convention, Great Falls, Mont.

Dec. 1952— Chicago division of CAO and CAA Regional Air Safety forum. The topic will be "Weather Flying" with special emphasis on Icing.

# Performance

# PITFALLS

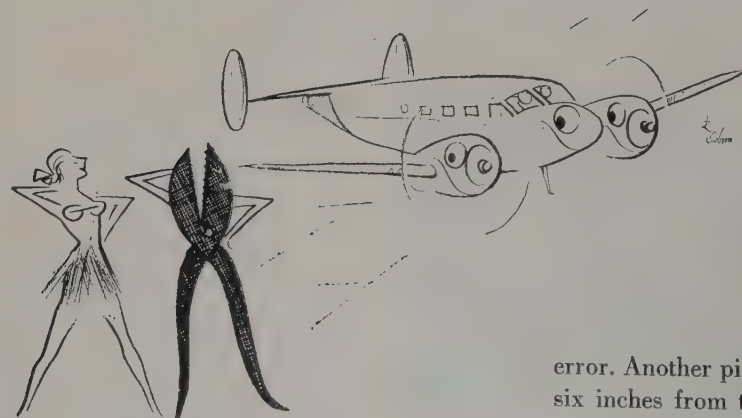
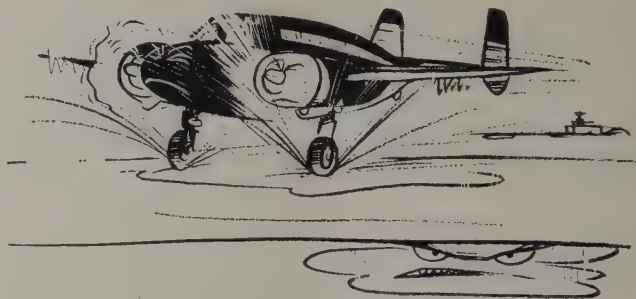
from the Files of the Flight Safety Foundation

by Jerome Lederer and Robert Osborn



## Blind Take-Offs

There's nothing innocent about a puddle of water on a runway. It's a danger spot. The water may not only damage flaps on landing but also can be something less than an aid to the crew on take-off. Water splashing onto the windshield can obscure vision completely. In freezing weather the resulting ice may be difficult to remove, could create prop vibration, and prevent retraction of the undercarriage. Pilots, beware of those puddles!



## Pilots to Wonder About

One able-bodied (then) airman took off without completing a check list. He took off with the gust locks on! Another discredited (now) pilot had a cockpit full of navigational aids for checking and re-checking his position. But he had a crush on just one of them . . . and it led him astray and into a mountain. Moral: Be faithful to a check list and dote on *all* your instruments, not just one.

## Magnetism

A blond isn't the only thing that can pull a pilot off course. Photographic exposure meters, earphones, and manuals bound with steel covers can affect a magnetic compass if they're sitting anywhere near it. One pilot found out that an exposure meter lying within four inches of the compass caused a 23° error. Another pilot discovered that a pair of pliers sitting six inches from the compass produced a 10° error. And prop de-icers, when turned on, tend to cause the compass to read as much as 12° off!

# PLANE FAX

## Quick picture of FANCHER FIELD Wenatchee, Washington

3400' runways, lighted on request . . . minor and major repairs for light planes . . . flight school, CAA examiner on field . . . restaurant (home-made pies) . . . U-drive cars and pick-ups available . . . 2 miles from Wenatchee . . . complete Standard Oil Aviation Service.

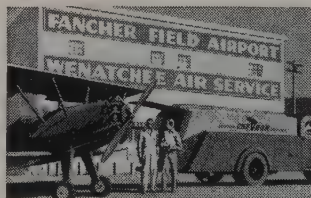
## How planes aid the world's biggest apple crop



Russ Parkhill, manager of Fancher Field, tells this story:

**"Planes play a big part** in helping orchard men with their crops in the Wenatchee Valley—apple capital of the world. From March until harvest, we have ten planes dusting and spraying orchards. It's tough flying—and tough on engines. That's where Chevron 80/87 Aviation Gasoline and RPM Aviation Oil have really proved they're tops with us.

**"On one Lycoming** 115 h.p. engine, for example, RPM Aviation Oil gave us 1150 trouble-free hours before we decided it would be a good precaution to overhaul the engine. When we took it down we found virtually no sludge deposits and wear was negligible. The rings and valves were like new—and we estimated the engine could easily have gone to 1500 hours without being touched.

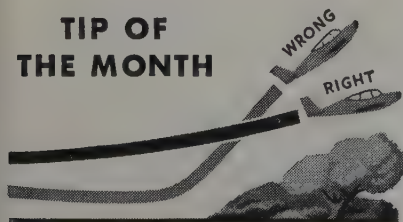


After using them for seven years, we still think Chevron 80/87 and 'RPM' are the best aviation products money can buy."

**"Full power flying** and sudden pull-ups are commonplace with us—because so many orchards are located on hillsides. That's where we depend on Chevron 80/87. Not only does it give us the take-off power we need for heavy load flying, it also eliminates the danger of overheating and pre-ignition—two big hazards in our kind of flying.

T.M.'S "RPM," "CHEVRON," REG. U.S. PAT. OFF.

### TIP OF THE MONTH



Russ Parkhill says: "High speed stalls from sharp pull-ups are a real flying danger—especially in hot weather with a heavily loaded aircraft. A gradual climb is a better and safer way to make sure you clear obstructions."



STANDARD OIL COMPANY  
OF CALIFORNIA

# Skyways Round Table

(Continued from page 13)

points that were discussed with CAA and CAB on the collision problem. Some of these things have been implemented and we have been doing some safety work in connection with collision hazards by sending out bulletins and talking with groups of pilots.

"I'll open this meeting by calling first on Al Bennett to discuss the problem from the point of view of the private pilot. Did you ever have any near-misses yourself?"

**Al Bennett** (Vice Pres. Taylorcraft): "A couple—one a long time ago. In 1940, my wife and I were flying along and she nudged me. I looked up and right into the prop hub of a single-engine Navy plane. I just went down and under. I don't think he ever did see me."

**Jerome Lederer**: "Why did your wife see it before you?"

**Al Bennett**: "Pilot-like, I must have been looking at the scenery. I don't know why she saw it before I did, but she did."

**Jerome Lederer**: "Did you have another incident?"

**Al Bennett**: "While I was flying an Aeronca Champion from Middletown, Ohio, to New York, I was way out over the Pennsylvania hills and I didn't expect to see another airplane. Matter of fact, I hadn't seen one on the whole flight. Then I looked off to my right and it was just as though I were looking into a mirror at my own ship. It happened to be another Aeronca Champion and we were crossing courses. I don't think he saw me either."

**Jerome Lederer**: "Were they en route flying or approaching an airport?"

**Al Bennett**: "En route. The first one, I guess, was around 3,000 feet and the second about 5,000."

**Jerome Lederer**: "How many hours of flying have you had?"

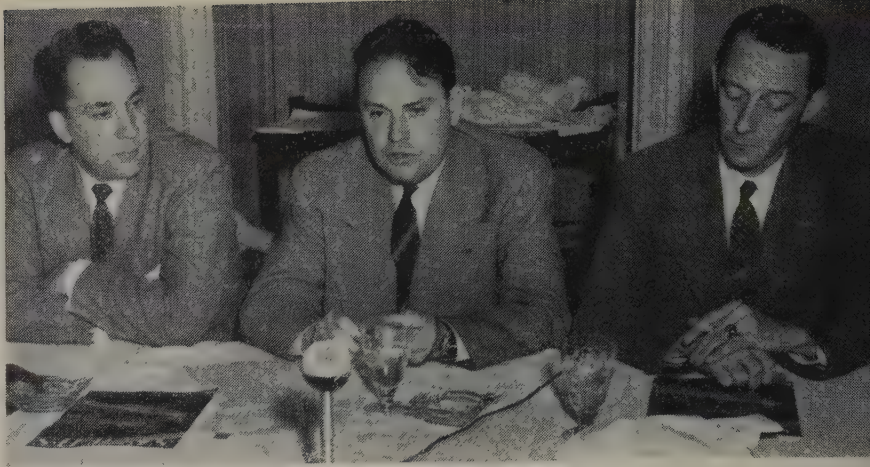
**Al Bennett**: "About 11,000."

**Jerome Lederer**: "Anybody else here have any near-misses? Cole Morrow, how about you?"

**Cole Morrow** (Chairman CAO): "In the last four years, I have had three: one with another corporation airplane and two with airliners. In two of the three cases I saw the other airplanes but I don't think they ever saw me. In one case I had a near-miss with an airplane overtaking me from the rear, directly above. I was climbing at a slow speed and the other airplane was descending at a high rate of speed. They both happened to be Twin Beechcrafts. The other plane went directly over the top of me. It was in weather with visibility about 2½ miles."

**Jerome Lederer**: "Were you both letting down to an airport?"

**Cole Morrow**: "I was climbing and he was letting down. I know the other airplane was close because I could read the number of the plane as it went over the top. I recognized the airplane and later talked to the pilot. He hadn't seen me at all.



**CAOA CHAIRMAN** Cole Morrow, with Howard Pember (left) and Dave Little (right), reports on near-misses he has experienced. Mr. Morrow called pilot's paper work contributing factor

"In another case, I was IFR and had reported over a fan marker and was cleared for an approach. It happened to be Cleveland. As I reported over the range station, I heard an airline flight reporting over the marker I had just passed, and he, too, was cleared for his approach. At about the same time I heard him, he passed 150 to 200 feet to my right—so close I could actually see him. And this was on instruments! Talk about not being coherent, I was really scared. Since I was on instruments, it wasn't one of my best approaches because I still didn't know where he went.

"The other incident happened recently. I was flying west and it was about 80% instruments—in clouds and out of clouds. Just as I came out of the clouds, there was a DC-6 looking me right in the face. I dove the airplane down and to the left. I don't think that they ever saw me either. We later checked and found out what flight it was. I talked to the pilot and he had no knowledge of it. It happened over Phillipsburg and I think it was just a case of not being at the right altitudes. In my humble opinion, one of the things that would help a great deal on collisions would be to cut out the requirement for crew members to do a lot of paper work, keep log books, etc., en route, and particularly during ascents and descent. I think it's even more important in marginal weather than it is on solid instruments. In each of the cases that I've talked about here, I think paper work had something to do with it, distracting the attention of the pilots. Incidentally, as a result of this experience we have made a rule in our own company operations that pilots are to do no book work of any kind in flight at any time. They do it all on the ground, either before they start or after they land."

**Jerome Lederer**: "Mr. Morrow, you have reported three incidents in which you have seen the other fellow and he hasn't seen you. Is it possible that there may have been near-misses where you haven't seen the other fellow and he has seen you?"

**Cole Morrow**: "Certainly, it is possible but I hate to think of it! Maybe we're better off

not knowing about the near-misses."

**Jerome Lederer**: "Sam Saint, how do the airplane pilots feel about not doing paper work in climb or descent?"

**Sam Saint** (Dir. ANTC Div., Air Transport Assn.): "I think it is generally accepted as being bad practice among airline pilots to do paper work during climb or descent. Dave Little can speak for American Airlines. I think there are several airlines that specifically regulate against doing paper work in the cockpit during climb and descent. It is a very logical thing. Further emphasis on the importance of limiting cockpit duties during climb and descent is one of the things that can be done immediately to reduce the danger of collision going in and out of congested areas where we're more vulnerable."

**Jerome Lederer**: "Dave, do you have any comment on that?"

**Dave Little** (Ass't Dir. Flight, American Airlines): "I believe, Jerry, that the majority of domestic air carriers now regulate against any paper work during climb or descent. In our case, it has been strictly against regulations for five years. We permit paper work only on the ground or during the en route cruise condition."

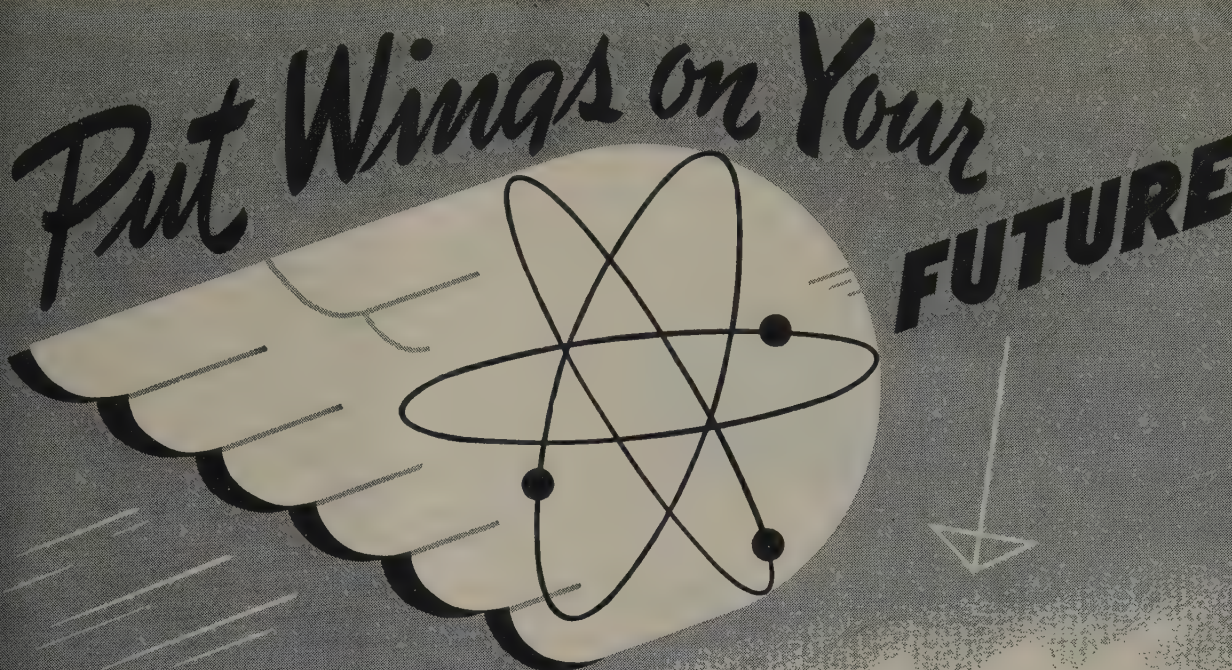
**Jerome Lederer**: "What about the other cockpit activities which might divert the attention of the pilot or copilot?"

**Dave Little**: "We stress the essentiality of maximum watch at all times. One pair of eyes must be constantly sweeping ahead."

**Jerome Lederer**: "Col. Bettinger, do the MATS have any policy on that?"

**Col. Bettinger** (Deputy Chief Pilot, MATS): "We recently had a very unfortunate accident that brought out one of two conditions which we feel are the most critical for mid-air collisions. The first one is when there are controlled aircraft either on actual instrument or on simulated instrument approach being controlled through an area where there are uncontrolled aircraft flying. That was the case at Mobile. One of our airplanes was making a simulated instrument approach, and the other was coming in VFR and uncontrolled and the two hit."

(Continued on page 40)



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We are glad to have the following letter from one of our former Air Force students:

"Dear Sir:

I attended SPARTAN between the dates, September 9, 1950, and June 2, 1951, under the Air Force thirty-six week A & E mechanics contract program. During that time and even up to now, I find your teaching methods and material covered, very effective, in that men down here who went through SPARTAN seem to know so much more about the aircraft in general than do the graduates of other schools. This was proven when we came down here from Sheppard Air Force Base with graduates of other schools, after attending F-80 specialist school. When we arrived here we were put to work on F-84's, which are entirely different from the F-80 in every respect. Graduates of SPARTAN caught on to the make-up of the F-84 more quickly than the others."

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TULSA, OKLAHOMA

# Skyways Round Table

(Continued from page 38)

"The other area where we have been quite negligent is on night take-offs. We have been using our check lists in various manners, and one of them has been to use a flashlight or a dim light over the copilot's shoulder so he can read the check list. On night take-offs, almost invariably the pilot is completely on instruments as soon as he leaves the ground. We have recently discovered that it is common practice to complete the flying check list or the post take-off list during the period immediately after take-off. There is a period there when neither of the pilots nor the engineer has been really paying attention to what is outside of the cockpit.

"We have recently put out a very strict memorandum on that particular point—night take-offs and the use of the check list with any sort of light that would prohibit their seeing outside.

"This particular area where two types of



**MATS** representative at "Air Traffic Control" meeting was Col. S. P. Bettinger. Seated next to him was Herb Fisher (left)

flights are being conducted in the same area is very critical where the pilot of one aircraft under control feels quite secure in the ability of the ground people to separate him from other aircraft, and yet at the same time there are airplanes in the vicinity that are under no control whatsoever. We have stressed that at any time when you are under ground control and you are in marginal instrument conditions, you will attempt to be sure that your separation from other uncontrolled traffic is further implemented by your own efforts in looking out of the cockpit.

"There is another area of discussion in the Services at the present time and that's the limits of VFR, particularly with the faster airplanes. I feel and quite a few other people in the Air Force feel that 3-mile visibility is below the minimum now for aircraft that are flying around VFR. I do know that's being given a great deal of consideration."

**Jerome Lederer:** "If you don't follow through your check list, what are the hazards you can induce?"

**Col. Bettinger:** "Well, it depends on the

type of airplane, of course. In MATS we have gone to a very detailed check list which is above average Air Force requirements. The aircraft that are being operated today are too complicated to eliminate the detailed check list and some of the items cover the period right after take-off. It's the time when the engineer or the copilot is down there adjusting power at 'exactly 36 inches,' 'exactly 2350 rpm,' and then he looks back at the next item which is perhaps 'turn your booster pumps on low'—and it's in that period right there, close to 500 feet after take-off, that this danger is most imminent. If we did away with consulting the check list during that period, I couldn't say without further evaluation what the hazard would be."

**Jerome Lederer:** "I'd like to add a comment to that. I think Col. Bettinger has turned up one of the things that might be given very important consideration at this round table discussion. That is the need for redesigning holders and check lists and charts so that they can be presented to the pilot properly lighted for night operation, to prevent the pilot's darkness-adaptation from being knocked down, etc., and to make it easy to get at the information he needs at the moment. I feel that this is one of the weak points in our operation today. There is very little standardization among airlines on this point. Pilots on approach are required to dig a big heavy manual out of a kit bag and read details, small print on 8½ x 11 sheets. I feel that some real effort on the subject of properly presenting approach charts, airways navigation charts and check lists to the pilots should certainly bear fruit. I think we ought to emphasize that point."

"Do you have any comments, Capt. Ueltschi?"

**Capt. Al Ueltschi** (Pres. Flight Safety, Inc.): "It is our company's policy to never read an after take-off check list until after passing through 1,000 feet above the ground. We believe that both the pilot's and copilot's attention is needed for conducting the take-off and watching local traffic. For this reason we specify that no take-off check will be requested until after passing through 1,000 feet."

**Murray Block** (Airways Operations Specialist, CAA): "How do you people feel about the control of all aircraft, particularly within terminal and control areas during the hours of darkness, that would allow the pilot a portion of reserved airspace and permit adaptability of his actions dependent on known traffic conditions?"

**Dave Little:** "Answering your question on night VFR operations, American Airlines feels very strongly that there is no such thing as VFR operation at night. Night is and always will be an instrument operation."

"A particularly important factor is that the present configuration and installation of aircraft navigational lighting is very inadequate. The human eye cannot resolve closure angle and closure rate on flashing lights alone. That is a well-known psychological fact. Flashing lights as used today on most

aircraft have great value for identification purposes when the aircraft is over a well-lighted ground area. But we should have, in addition to those flashing lights, relatively high-powered, steady burning lights to permit the human eye to resolve the problem of closure angle and closure rate. Until the national situation on aircraft lighting can be changed to encompass that condition, we feel very strongly that all traffic, particularly in terminal areas, should be fully controlled."

**Jerome Lederer:** "How do the Air Traffic people feel about that?"

**Bill Parenteau** (Chief Airport Traffic Controller, N. Y. Tower): "I realize that from a safety angle, it would be highly desirable to apply standard separation to everything—regardless of whether it were night or day. In other words, if everything that was being controlled, you wouldn't have to worry about the occasional closure from the sky from above that you couldn't see. But I will probably recall, Dave, two and a half years ago, such a procedure was in effect. However, it didn't last for more than two or three days. The hue and cry was terrific, because it cost the airlines a lot of money. And I am sure everyone is aware that there has to be a give and take on this. You don't sacrifice safety but still permit an airplane to fly. In other words, if we were to resort to straight standard separation during VFR weather as it is applied during IFR, we would also slow traffic down to the speed of a straight IFR operation, which in turn would not permit the same volume of aircraft to fly."

"I know that the air-carrier people and the Air Traffic Control have long recognized that 1,000 and 3 is certainly no longer proper criteria for VFR operation—particularly the 3-mile factor. That 3-mile factor was applied, I think, with the DC-3 standard. Get a couple of Conquairs running towards each other, and I think it flies out at the same rate-of-closure to around 10 miles. Visibility should be jacked up to at least 5 miles. That recommendation, I believe, has been made throughout the industry. I am curious to know if the recommendation by ALPA and other interests also takes account the economic angle. This has been considered by them because the air carrier, after all, will be the one who foots the bill on it. The corporate aircraft owner, too, foots the bill in having to wait on the ground for departure. When corporation president want to get somewhere, they want to get there in a hurry, and they do during VFR weather, but if they were always subject to straight IFR separation, I'm sure they'd be going by train before long."

**Murray Block:** "The use of VFR during hours of darkness has long been recognized as a compromise with safety. While we are not equipped at the present time to handle all night air traffic without delay, I believe the installation of terminal radar at airports and complete air/ground control in air route control centers would suffice to control this traffic with a minimum of

"There is also the possibility of requiring VFR aircraft, during the hours of darkness and properly equipped, to file and comply with flight plans including altitude information when proposing to fly the airway system. The aircraft would be provided no separation other than airport, but would be posted and exchanged as traffic information by the appropriate centers."

**Al Ueltschi:** "Washington has been trying this radar departure control even in VFR conditions. I have been flying in and out of there the last few months and I think it's worked out very nicely. I don't think it delays traffic too much. The only bad feature is they don't know the altitude of the other aircraft, but they will advise you if there is anything in your vicinity and they tell you what his course is. I think radar departures will probably be the answer to this problem in VFR and IFR conditions in congested areas."

**Jerome Lederer:** "Why must it be the full IFR control? Isn't there something in between VFR and IFR?"

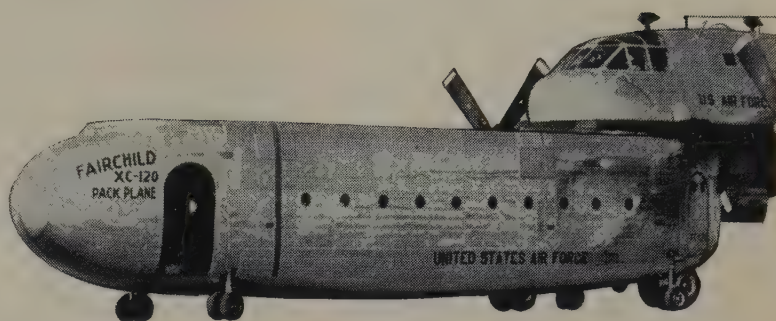
**Sam Saint:** "I'd like to speak on this subject just a little bit. This is the subject that I had on the top of my notes scribbled prior to the meeting. It's not an easy subject. It's very complicated and it gets involved when you start thinking about the airplanes that are not equipped to operate in an area with full traffic control, clearances, etc. Let me preface my remarks on this subject by saying that I think we must recognize somewhere along the way that we cannot permit indiscriminate operation of uncontrolled traffic in certain of the most critically congested areas in the country. I don't know how the small-plane operators feel about this, but I think the small-plane operators should be just as much afraid of operating in the Maspeth, Flatbush area near LaGuardia on a smoky evening as I am coming in with an airline airplane, knowing that a small itinerant airplane can be wandering across that busy section of airway. It's inevitable that we must sooner or later on a careful step-by-step basis go toward positive control around the clock in certain of the most critical areas."

"Now I think you have to back off for a minute and define what you mean by *positive control*. The over-all goal is to build a traffic control system that is so good there is no need to back away from the full IFR operation in VFR weather. In other words, the IFR system should have the same capacity to handle traffic as the VFR system has. If you could arrive at that crystal-ball end result (that Jerry won't let us talk about here), the incentive for going VFR through these areas would be reduced or possibly eliminated. However, that's a little way in the future."

**Bill Parenteau:** "Sam, what has been done with regard to the recommendations which were made to control the 'occasional' aircraft, and what restrictions, or retributions, or punishment, or fine will be imposed on the fellow who doesn't care, and will not

(Continued on page 42)

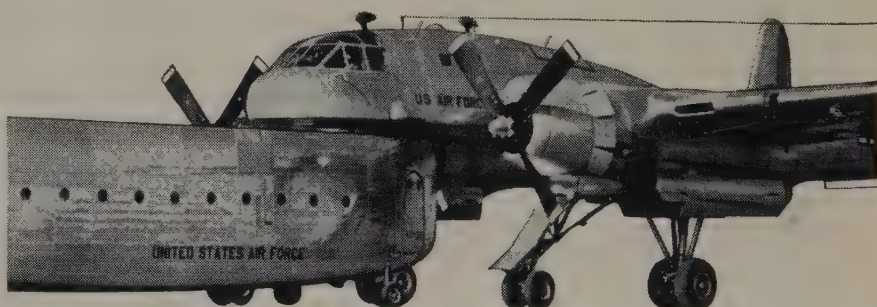
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# Skyways Round Table

(Continued from page 41)

abide by the recommendations? Is it being put in Civil Air Regulations, making it mandatory that flight be so conducted? We all recognize that with the present-day speed of aircraft something should be contained in the regulations prohibiting flight at the old minimums, and with enough 'teeth' in the regulation to assure that those who depart from it will be penalized—a sort of non-habit-forming insurance."

**Sam Saint:** "This is like the immovable object being acted on by an irresistible force. Most pilots want to comply with regulations. Many times non-compliance results from rules or procedures that are too complex. Present navigation is not easy for the inexperienced pilot. Take another angle . . . it is not possible for a pilot to anticipate variations in the weather. Pilots don't always wind up milling around in marginal weather through carelessness. So, I would ask this question, 'Would you fine the committee sinner who failed to simplify the procedure or would you penalize the engineer who failed to come up with a simple little black box to tell a pilot where he is, without a lot of mental gymnastics?' Of course, there is still the willful violator who endangers himself and others. I think we would all like to do something about him, if we knew how to pick him out."

**Norman Smith** (*Airways Opera. Specialist, CAA*): "I would like to point out something now that I feel is very important in our traffic control system. Not only are VFR limits hazardous as they are today but I feel that this '500 on top' is a very hazardous situation with the speed of aircraft that we have today—jet aircraft, DC-6's, Connies, etc., climbing through an overcast to a '500-on-top' en route altitude. In my opinion, it has reached the stage where I consider it very hazardous. I have actually experienced times when an aircraft was not '500 on top.' Even if he were, I don't think that amount of separation is sufficient."

**Sam Saint:** "I would like to point out again—that pilots flying VFR all too often wind up in an IFR situation, and in most cases it happens unintentionally, particularly at night. It's frequently impossible to foresee that two minutes later or one minute later you're going to be actually on instruments. The traffic control boys can certainly confirm that when a pilot who is operating VFR suddenly declares he is IFR, traffic control is thrown into an immediate spin trying to give that fellow protection. They didn't anticipate that he was going to need protection. This hybrid operation that we conduct now—this cross between IFR and VFR and switching back and forth from one condition to the other—is certainly one of the most complex and exasperating and perhaps hazardous problems in air traffic control today. Do you CAA fellows subscribe to that?"

**Norman Smith:** "I think that at New York Idlewild and LaGuardia the traffic control

people have made great strides in handling all inbound traffic. Procedures are so designed today that all inbound aircraft contact Approach Control for clearance into the approach control area. In doing so, that procedure eliminates the possibility of the weather that you spoke of—coming into an area VFR and suddenly realizing that you are on instruments. If all inbound aircraft contact Approach Control, it is possible for Approach Control to put them into a sequence regardless of the condition. Any unforeseen condition may exist and it still is possible for traffic control to handle. In other words, they are able to provide instrument separation whether it is VFR flight or not."

**Jerome Lederer:** "There are three unanswered questions that I want to go back to. First, Mr. Block wanted to know what the pilots want in the way of traffic information."

**Murray Block:** "And the controlling of all aircraft, particularly at night. It seems to be the general consensus of opinion that in certain terminal areas positive control during the hours of darkness is highly desirable. I gathered that from the comments of Dave Little, Sam Saint, and Capt. Ueltschi. I think the industry as a whole and the CAA people feel very strongly in that respect. We would like to see it. I believe it is being considered at the present time by the top-level thinking in Air Traffic Control."

**Sam Saint:** "We would certainly like to see it. We're trying to bring it about by means that remind me of what the preacher said, 'you've got to learn to cooperate with the inevitable.' In other words, we should rig the control system so that people will want to do it that way, and we won't have to stuff something undesirable down anybody's throat. I think that Huck Smith was talking about the same thing when he mentioned radar control. We are making real progress in radar traffic control. The Washington radar departure control system that Capt. Ueltschi spoke of has now been accepted and will be implemented in 10 or 12 locations before next winter. We still have some problems

with inbound radar control, but they are being worked out."

**Jerome Lederer:** "Mr. Smith, do you or do you not feel that there should be higher minimum above the clouds?"

**Norman Smith:** "I feel there should be a higher minimum above the clouds."

**Jerome Lederer:** "The man that can answer that is the private pilot. Al, how do you feel about having higher minimums above the clouds—or below?"

**Al Bennett:** "The planes that I fly and a lot of people like me aren't very fast and it is often that we get up above there, but I agree with Mr. Smith that there are a lot of high-speed aircraft that we don't want to get in the way of."

**Jerome Lederer:** "You have something on the same questions, Mr. Pember?"

**Howard Pember** (*First Pilot, Texas Co.*):

"Yes, I was westbound toward Stroudsburg 500 on top, clear on top, in a DC-3, and all at once I noticed a scheduled-airline DC-6 just forward of my leading edge. With a 1200- or 1500-foot per minute climb, he'd overtaken me both from the standpoint of speed and climb. I could see the copilot's hands through the window and I know no one saw me. If it hadn't been for chance, it would have been a collision, because I never would have seen him forward of our aircraft. That difference in speed and his high rate of climb made "500 on top," which was what I was maintaining despite the visibility, a potentially dangerous situation."

**Jerome Lederer:** "The third question would be in Mr. Bennett's category. How do you feel as a private pilot about raising these minimums?"

**Al Bennett:** "I think we want to decide on the various departments of the problem, and I think I am the only one here that's in the little-airplane class. Everybody else is concerned with big airplanes. We have problems of our own and we can be problems to you, too, by getting in your way. We don't want to do that."

"Most of the discussion here today has

**POSITIVE CONTROL** of all aircraft in terminal areas was recommended by Sam Saint (center). With him are Skyways' Publisher, J. Fred Henry, and Texas Co. pilot, Howard Pember.



dealt with the dense traffic areas, but there are thousands of fellows way out in the woods of Wisconsin and Montana that never see a control zone or an airliner, and somehow we want to take care of those fellows, too. Most of them would be afraid to come into a congested area and, particularly, into a busy airline terminal. They'd feel so ill at ease that they wouldn't know what to do. They wouldn't know how to talk to the Tower if they had a radio, which a lot of them don't. So we've got to include those fellows in this discussion somehow."

**Jerome Lederer:** "There are large areas of operations where a radio is useless and where it would be in the way. For example, in crop dusting operations—you wouldn't want a radio there. I think we have to confine our discussion today to the congested areas and leave the others to another time."

**Al Bennett:** "That's okay as long as we don't forget the other guy."

**Jerome Lederer:** "Mr. Husak, do you have anything you want to say to add to this?"

**Paul Husak** (Sr. Flight Dispatch Coordinator, TWA): "We pretty much agree with what Dave Little from American had to say. I know TWA, for example, very much discourages any VFR operations. Our flights under any weather conditions day or night are all IFR. We'd like to see the whole thing set up just that way."

**Jerome Lederer:** "Do the pilots generally understand that the fact they are on an IFR flight plan doesn't mean that they are not actually flying along with people who are on VFR and that they should be alert at all times?"

**Paul Husak:** "We understand that and we caution our crew members to be on the alert, particularly on the climb and let-down."

**Jerome Lederer:** "Is that generally true for all airline pilots, Sam, the fact that they have an IFR current doesn't mean that they have an open channel?"

**Sam Saint:** "I think the pilots understand that IFR clearance does not protect them from VFR flights. I think they understand this today. There was a time when very few

pilots did understand it, but that is several years past. Can we go back for a moment to Paul Husak's comment that<sup>\*</sup> TWA discourages VFR operation. Filing an IFR flight plan all the time is not the answer to this problem. This will work fine as long as only a limited percentage of the total traffic requests IFR handling. If all airlines were to file IFR all the time, I think delays would immediately force a reconsideration.

**Col. Bettinger:** "Well, I can add to TWA that all scheduled flights in the Military Air Transport Service are also conducted under IFR flight rules at all times. However, most of our flights are overseas. There are several flights that occur from the central part of the United States to the overseas point, and we have had to stress that an IFR flight plan is not a guarantee of safety from other aircraft."

**Dave Little:** "Might I point out that if American on its high-density operations between Boston, LaGuardia and Washington required all its schedules to file IFR, TWA and Air Transport might stop moving. It is understood that the present air traffic control system will handle only approximately 40% of presently scheduled operations. That is why we operate VFR as long and as far as possible, because John Q. Public wants to go places. It is believed the problem is one of providing the traffic controller with the tools to handle required control of traffic as expeditiously and efficiently as uncontrolled traffic can be operated. A summation of several studies has indicated beyond any question of doubt that, given the tools, the traffic controller can operate aircraft in and out of a given concrete runway more rapidly and more safely under fully controlled conditions than any experienced pilot can operate visually."

**Norman Smith:** "That was borne out in the SWG-5 demonstration, I believe, at Wright-Patterson to the point where the traffic was handled so fast that runway saturation occurred. Through the implementation of the recommendations set forth in SWG-5, I believe that traffic control could adequately handle traffic as fast as our airports today can take it."

**Dave Little:** "Studies at LaGuardia indicate conclusively that under radar control, night VFR can be much more efficient and safely controlled than VFR. In other words, the Port Authority's runways are used much more efficiently under that 'semi-control' condition (when radar is used during night operations to safely space arriving traffic) than any pilots or controllers can achieve under visual-operation standards."

**Cole Morrow:** "I don't believe there is any such thing as night VFR operations. A great many near-misses that neither of the pilots actually see probably occur during so-called night VFR operations. I believe that all night operations should be controlled under some form of IFR rules, maybe not the same kind of IFR rules, maybe a night IFR rule. I don't know whether it would be practical to have another set of rules or not, but night operations certainly ought to be controlled."

**Dave Little:** "I think everyone at the table

knows the accepted principles of ANC standard separation—either altitude or time or lateral. Therein lies one of the greatest inadequacies of the present control system. Modern aircraft are of too varying speeds—you have the 'windmill' with its slow-speed operation arriving with the jet with its 600-mile speed. One can't resolve the speed variation with currently available tools. But with radar you can put separation on a strictly distance basis, forgetting the time or altitude elements. By making it pure distance one can achieve far greater utilization of air or runway space."

**Jerome Lederer:** "When you say 'radar', what do you mean?"

**Dave Little:** "Using ground radar to keep aircraft separated a safe distance."

**Jerome Lederer:** "With radar beacons in the airplanes?"

**Dave Little:** "Not necessarily. It's a question of the radar itself."

**Jerome Lederer:** "Are you talking about night VFR?"

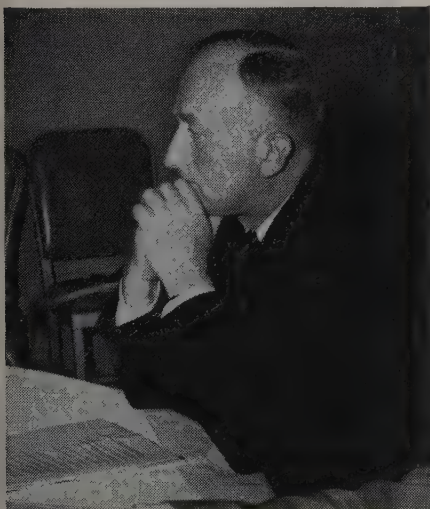
**Dave Little:** "That's right. Speaking in connection with currently available ground radar, the radar beacon is of primary importance in conditions of precipitation. Usually, under night VFR, precipitation is no particular problem. If you give the Air Traffic Control people the tools with which to do the job, which amounts to radar in the broad general sense plus mechanical interlock automatic flight data transfer equipment on the ground, and change allowed ANC separation from the old time-altitude requirement to one of strictly 'distance-by-radar,' we could move more traffic safer, visually or on instrument, than we have ever dreamed of doing."

**Jerome Lederer:** "How many stations in this country are equipped with radar?"

**Dave Little:** "I would say none at the present—speaking of traffic control radar or approval to use radar for traffic control purposes. There is one highly experimental set-up at Washington which shows promise."

**Bill Parenteau:** "Dave, it would still remain a case of 'controlled areas' and 'non-controlled areas' even with radar—or else plan on having complete radar coverage of the United States. Assuming that radar could accomplish this gargantuan task of which you speak, I don't think merely giving the controller a radar unit would suffice, because a common airspeed is so unlikely. To use my own shop as an example, if we knew we had a guarantee of, or at least an attempt for a common airspeed, a common rate of climb or descent, we could definitely reduce separation minimums between aircraft and achieve a pretty darn good percentage of accuracy in desired interval between successive take-offs and landings. Similarly—and I think this is basic and could go into effect right now—we could also reduce separation minimums if we had assurance that every aircraft that proposed entering a given area was going to contact us beforehand and establish two-way radio contact. If you don't have that contact, radar can't help you, because you can't control an aircraft you can't talk to."

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# Skyways Round Table

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"I use the expression, 'garbage plane,' to describe an aircraft that flies rather recklessly. Given such a 'garbage plane' in the New York Metropolitan area, it can cause untold hell, whether it's IFR or VFR. I think Civil Air Regulations used to demand that aircraft receive clearance from the control tower prior to entering a control zone. It's true that there are a lot of aircraft that have no need for radio, but my point is—if they're going to fly in a congested area where traffic control is necessary, they should be properly equipped. Personally, I would like to see a regulation established that prohibited aircraft from flying into LaGuardia or the Metropolitan area that did not have two-way radio communication equipment and, further, that such two-way communication be demanded prior to entering the area.

"But even though we might always have two-way radio communications, I don't think that radar can do it alone. Because of the varying airspeeds of aircraft, the controller might become completely absorbed with, perhaps, three aircraft while trying to set up a sequence—a sequence which would be constantly changing because of varying airspeed between the aircraft, even though a common flight path.

"I heard Murray Block groan at the statement that, 'if given the tools, we could complete 100% of operation during night VFR.' I think the Center would also have the same problem. They, too, would get an interchange of aircraft position because of varying airspeed. It's a complex problem. It could be met in part right now by the requirement of two-way radio contact, and certainly, radar can advise identified aircraft that are observed to be in close proximity. Similarly, when aircraft arrive simultaneously over a fix, a slight turn serves to identify one, and thereby permit diversionary action."

**Dave Little:** "I am sure you and I are speaking exactly the same language. I am sorry I used the term, 'radar,' in such a broad

sense. What I am talking of is the full implementation of the total thinking of SWG-5. This involves full control, radio communication, radar separation and all that it takes to go with it."

**Sam Saint:** "I think we're drifting away from what SKYWAYS is after here. SKYWAYS wants to know what is causing our potential accidents and how they can be eliminated. I'd like to say that from my experience a lot of our potential accidents and traffic confusions are a direct result of misinterpretation of clearances, non-adherence to standard practices in traffic control procedures, and inexperienced personnel. I think those are subjects which we want to pursue in our discussion. By implementing such procedures as Mr. Little and I have talked about, (SWG-5) wherein we can take the radar equipment and the electronic devices we have today and go back along our airways and establish an orderly flow of traffic into a terminal area, we can eliminate a lot of those potential confusions."

**Jerome Lederer:** "One time, Dave, you discussed with me the idea of giving airline-type indoctrination to pilots who are not flying the airlines. What is being done about that? Capt. Ueltschi is doing a lot of work, but are the airlines doing any training?"

**Dave Little:** "Yes, I believe most all of the large corporation users of aircraft have funneled their pilot personnel through airline training schools and by so doing have achieved standardization of pilots. I know that several of the large corporations are now operating their pilot groups exactly as the airline's are being operated—with check pilots, routine line and instrument checks."

**Jerome Lederer:** "Capt. Ueltschi, have you a comment on that?"

**Al Ueltschi:** "I would like to go back to the problem of VFR flying. I don't think we're going to eliminate hazards by passing new laws. We must have laws, but I don't believe too much in new legislation. I believe more in education. I think you will find that many pilots pay attention to business when they are operating in full IFR weather condition, but strangely, air collisions almost invari-

ably have occurred under ideal weather conditions. Unlimited visibility seems to encourage a sense of security which isn't at all justified. If we raise the VFR minimums to 5 miles, everybody immediately says, 'If it's 5 miles there's nothing to worry about. It's safe.' That's the way it is now, it's 3 miles and it's VFR, so everybody says, 'Well, let's go fly.' If we raise it to 5 miles, we are still going to have to train the crew for better crew coordination so that they have a systematic way of looking out. I don't think that we can solve the problem by just passing a new regulation saying that everybody must be 1,000 feet on top instead of 500 feet. I think we're going to have to work toward education."

**Jerome Lederer:** "Mr. Morrow, what is the point of view of the executive pilot?"

**Cole Morrow:** "At the present time along the airways our regulations are only one mile forward visibility and it is a fact that a number of people think that if the regulations say it is one-mile visibility, it means that it is safe to go ahead and fly VFR. I agree with Capt. Ueltschi that nothing is going to take the place of two good eyes being used, and I think that the education that will make it easy for them to do it is the real answer. I've found that if you want a man to do something, you make it easy for him to do it and he'll do it. If you make it hard, he doesn't do it. So through education and making it easy we can accomplish a great deal more than we can by changing the laws."

**Jerome Lederer:** "Are you encouraging pilots to take the airline indoctrination?"

**Cole Morrow:** "Definitely. Practically all of the corporation aircraft that are operated on instruments do so according to the same procedures used by the airlines. A large percentage of the pilots have had some form of airline training prior to the time they started corporate flying. Capt. Ueltschi's company has been set up to furnish the facilities for training.

"One factor that has also influenced the corporation pilots to operate according to airline standards is the insurance companies. The insurance checking and insurance requirements for pilots is far more rigid than CAA's requirements for pilots. The fact that a pilot has a certificate doesn't necessarily mean he meets the insurance companies' requirements. In my opinion, more progress can be made through the insurance companies in pilot checking and standard procedures than any rule or regulation.

"It's quite evident that in the future we are going to have things such as the universal application of radar in the terminal area to help us in traffic control. But there is something I think we can do right now—it wouldn't cost anything and it wouldn't be much of a problem—and that is that all communications with regard to traffic control be transmitted on all frequencies at the same time. This is particularly important in VFR operations. If I'm flying an aircraft and listening on the standard private frequency and the Tower is communicating with a military airplane on a military frequency—maybe

**CAA REPRESENTATIVES** at the meeting were Ralph D. Byrnes (left), William Parenteau and Norman C. Smith. Bill Parenteau is Chief Airport Traffic Controller at New York's LaGuardia



he's giving him traffic instructions, I don't even know he is in the area unless the Tower transmits on my frequency, too. If all such communications were transmitted on *all* frequencies, I would know he's in the area and would make an allowance for him and be on the look out. Through CAO we have actually made that recommendation in writing to the CAA. By coincidence, we made that recommendation just two weeks before the crash of the airliner and the P-38 down at Washington National. I believe in that particular case had all frequencies been used so that the airline pilot could have heard what they were trying to say to the fighter pilot and vice versa, they wouldn't have run into each other. Each would have been on the look out for the other."

**Bill Parenteau:** "That's a sore subject, Cole, and we can certainly appreciate your point of view: that if *all* of the pilots could hear everything being transmitted on *all* frequencies within any terminal area, they would then know *all* the traffic. However, the frequency, the receiver, the pilot's ears or the controller's mouth has yet to be perfected that could either put out or absorb all that information on one frequency."

**Cole Morrow:** "So let it go out on *several* different frequencies."

**Bill Parenteau:** "At the LaGuardia tower we have broken the operation down into three frequencies and three separate controls: Ground, Local Control and Approach Control. Each has a separate frequency. I think the majority of pilots will agree that it's far better to have it that way. Granted, there is one fault in connection with the system: namely, it doesn't do what *you* want. However, we are exercising positive control over every aircraft that transmits on any frequency. We're required to keep them separated, regardless of who controls them or on what frequency. You shouldn't have to know, for instance, that Approach Control has an aircraft descending from 9500 to 8500 over Flatbush while you are inbound VFR over New Rochelle. Actually, we couldn't *get* all necessary transmissions on one frequency. Before we put in the different frequencies, the greatest pilot criticism of the Metropolitan area was that they couldn't get a word in edgewise to advise Air Traffic Control of their position. They would sometimes fly all the way from Portchester or Coney Island to the field without being able to get in a word. Traffic Control couldn't get them in order to apply separation, and the pilot was concerned because he knew he was barreling into a high density traffic area. Before he knew it, he was circling the field."

**Cole Morrow:** "So let it go out on *several* different frequencies."

**Bill Parenteau:** "That's the same thing."

**Cole Morrow:** "Obviously, we don't care about ground control in traffic control. I'm talking now of VFR operations, not IFR. It would certainly help, as I'm approaching an airport, to get some idea of what the traffic is, where the other airplanes are. I'd plan my pattern at that airport according to that information. Quite frequently in my per-

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sonal experience I have been in the control area circling the airport when all of a sudden an airplane would wing by me and I hadn't any idea he was anywhere around. He had been given clearance, he'd reported his position, etc., and had I known about it, I'd have been on the look out for him. I don't see why it's any problem, when you transmit traffic control, to press three buttons instead of one."

**Bill Parenteau:** "Let's put it this way: aircraft are checking in all the time at Matawan, Portchester, Teterboro, etc. They call (or are supposed to call) on 119.9 and the Approach controller then gives them essential field information, wind direction and velocity, and the runway to use. He tells them where they should call the Local controller on 118.7 megacycles. These transmissions are certainly not essential to aircraft on or near the airport."

"I can illustrate how it would be very impractical to try to give it to the fellow near the airport: let us say we get four estimates and all have arrived at the fix and are about to call. The pilot tunes in the Approach Control frequency, hears somebody is already talking, so waits to get in his contact to Approach Control. He then calls, Approach Control answers and gives him wind direction, velocity and runway. The second pilot, waiting his turn, then calls. He also gets the information regarding the field, etc. Now if we

were using your plan, Approach Control would have all three of our transmitters up and operating. The fellow at Ground Control couldn't use his frequency; the fellow working the hot runway couldn't use his frequency because no two positions can use the same frequency simultaneously. Ground and hot-runway controllers would have to wait until all four Approach Control contacts were through. In the meantime, you might be circling over the airport with other aircraft, waiting landing clearance from the hot runway controller. Similarly, aircraft cannot be departing because clearance cannot be delivered—the frequency is being used by Approach Control. Now comes the Local controller's turn: he starts clearing up airport traffic that has been accumulating while Approach Control was using the frequencies. He uses all the frequencies, and now aircraft just arriving at Portchester, Flatbush, etc., are forced to wait and listen to all the take-off and landing clearances *which they don't need at all!* Do you see the problem that you would run up against?"

**Sam Saint:** "The point is that the little fellow that comes into the area can listen on only the one frequency whereas the bulk of the operation in the terminal area is going through a succession of frequencies. Obviously, you cannot tie that single transmitter for the itinerant to Center Control, to

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# Skyways Round Table

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Approach Control, to hot runway control and to Ground Control. You just can't do it."

**Cole Morrow:** "Well, Mr. Parenteau, I guess I'd better rephrase my suggestion. Apparently what I said and what I meant to say are two different things. What I meant by 'all communications' is all traffic control instructions that are transmitted by the control tower only. Why can't those instructions be transmitted on all frequencies that are used for that particular function rather than on just one frequency? Those instructions could be transmitted on 278 kc as well as the 119.1 VHF tower frequency. In this manner each pilot in the area would have some idea of what is going on while listening to other traffic control instructions, and he would have some idea of what to expect. Obviously, it would not be necessary to transmit ground control instructions for the benefit of the planes in the air. Also, if IFR conditions prevail, it would not be necessary to use all frequencies. It is under VFR conditions that I feel the practice of transmitting all traffic control instruction on all frequencies should be used."

**Bill Parenteau:** "Cole, Control towers have been authorized to transmit simultaneously on low frequency and very high frequency since January of 1950. As a matter of fact, they've been doing so whenever the controller felt that all aircraft in the vicinity of the airport should be apprised of the total traffic situation. Similarly, we've also been authorized for over two years to transmit on two or more VHF channels on which aircraft adjacent to the airport are being controlled. However, whether it's a combination of transmitting simultaneously on one low and one very high, or two very high frequencies, we try to keep the practice at a minimum for this reason: as I pointed out earlier, simultaneous transmissions on any VHF frequency with any other frequency results in congestion of the VHF frequency so used, because its associated receiver is muted each time the same frequency transmitter is being used. Thus, if we transmit simultaneously on 362 kc and 118.7 mc, our 118.7 mc receiver is muted not only when we transmit on 118.7, but also muted when we transmit on 362 kc, since both are operated at the same time. As a result, the controller is unable to receive on 118.7 mc during any period either transmitter is in use. In short, we have the same result outlined before, however, to a lesser degree. Low frequency transmissions are definitely in the minority, but there are many that are made on 362 kc that do not even remotely concern aircraft on 118.7 mc and which we know would just unnecessarily jam the frequency."

**Al Ueltschi:** "I think this whole thing can be solved without being too complicated. The answer I think would be for the corporation pilot to be permitted to use the same frequency that the airline does for that area. Have all airplanes call Approach Control on

the same frequency, all call Ground Control on the same frequency in the same area. I don't mean to mix up all these frequencies. Keep it as we have it, but let the military fellow or the corporation pilot call on the same frequency as the airline boy does when he gets to Matawan, Flatbush or Relay. There is no reason why that couldn't be passed through the FCC."

**Ralph Byrnes** (*Airways Opera, Specialist, CAA*): "There are certain advantages and disadvantages in simplex transmission. In the old days when we had one particular frequency—a low frequency—for the tower, the tower transmitted all information on that one frequency and, of course, everybody didn't hear. Today, the private pilot, the corporation pilot and the air-carrier pilot can get all the information they want. As Mr. Parenteau pointed out, when an aircraft is on an Approach Control frequency, there is no reason in the world why he has to know what's going on at the airport. However, if the corporation pilot, the itinerant pilot, or the air carrier are tuned to a particular frequency, if it be the tower frequency—118.7, the corporation or the itinerant with the tunable VHF will hear all position reports as the pilots report in. They have a way of getting information on the aircraft they are particularly concerned with. It only means filtering out the aircraft calling over New Rochelle. But the advantage in simplex is in some cases overshadowed by the disadvantage. Where an aircraft is transmitting on a simplex frequency, the aircraft in turn cannot listen to that frequency. If it were necessary to break or interrupt them, it would be impossible until that aircraft had let up on his transmitter button. That is the disadvantage in simplex. The advantage is that every aircraft can get the traffic that he is particularly concerned with just the same as anybody else."

**Norman Smith:** "I would like to point out one thing here. Within the New York Metropolitan area you have Mitchel Field, Floyd Bennett, Teterboro, Newark, LaGuardia and Idlewild. All those towers are required to monitor a military frequency. That frequency, for example, is 126.18. If the tower controllers at Idlewild or LaGuardia work simultaneously on two frequencies, transmissions of any other aircraft that may be going into Mitchel or Floyd Bennett are blocked out. Therefore, it's undesirable from that standpoint."

**Jerome Lederer:** "Mr. Fisher, you have something to say?"

**Herb Fisher:** (*Port of N.Y. Authority*): "I just want to go back and add a little bit to this VFR. I've flown in the Metropolitan area for the last six years and the majority of it has been VFR at speeds between 250 and 550 at least. I think it is an absolute must for safety that these minimums in the control area be raised. I don't know how many of the men are operating at speeds of 250 miles or better, either climbing out or coming back into this control area, but it is almost impossible to close under the visibility conditions we have within a hundred miles of this Metro-

politan area. Sometimes when we are quoted 3 miles on top, or just VFR, it is way below that. I don't want to get into conflict with the Weather Bureau, but what happens is that we have this minimum that exists and yet in the majority of the cases we're flying less than that. Even though they quote VFR, I would actually like to have Traffic Control give us a clearance to climb out at either west, north or some direction that is clear. Sometimes you have to go to 10,000 feet to get on top of the smoke layer in the Metropolitan area. It might as well be instrument in most cases. I've seen Convairs and DC-6's letting down as far west as Allentown. They undoubtedly were on an IFR or being controlled and I wasn't."

**Jerome Lederer:** "I would like to ask Mr. Block if he has any comments on this matter of measuring visibility."

**Murray Block:** "I'd like to see the implementation of the British system of slant visibility in preference to our present method of reporting visibility which is based on the lateral distance of ground objects from an observer."

**Dave Little:** "We have long been screaming about control of airline aircraft landings by weather observations made from a specific ground point and by a specific observer which experience has proven means little or nothing with respect to the actual visibility during a normal approach of an airplane. I'd like to mention here that this screaming apparently has brought results. The ANDB, U. S. Weather Bureau and the CAA are now cooperating on a project which Sperry is implementing to ascertain the many variables between horizontal and slant-visibility measurements. The project is being directed at the development of equipment and techniques to provide the Weather Bureau and CAA slant-visibility instead of horizontal visibility. Good progress is being made on that right now."

**Jerome Lederer:** "I had a note from E. S. Calvert of the Royal Aircraft Establishment in England saying that they had licked it

**VISIBILITY** reporting was discussed by Murray Block who stated preference for British slant visibility system instead of lateral



over there and were using it. They're using the rocket system."

**Dave Little:** "Yes, they are using rockets and radar and that is being looked at here carefully, too."

**Howard Pember:** "This business of preventing mid-air collision, which is basically what we're discussing, evolves into two phases: one is 'under IFR conditions' where we have what you might call third-party intervention which is necessary and desirable to keep two airplanes from colliding; the second under what we refer to as 'VFR conditions' where the responsibility rests in the cockpit of two airplanes. Dave Little covered the problem of installing additional lights that would aid the pilot in night VFR, but then we get day VFR and the situation which Herb mentioned where you go out under control, someone else comes along not controlled and the visibility is marginal. No one is there to help you. You have to see the other aircraft. A lot of the airlines and private companies have come out with paint jobs, with a white reflective paint for passenger comfort. It has been my impression that it aids in visibility. It seems to me that I have been able to pick up another aircraft with this paint job more readily than I could when they had just the plain silver that corroded and blended into the haze. I was wondering if the gentlemen who work the towers have any evidence that would bear that out or contradict it."

**Bill Parenteau:** "Under certain conditions, they are more readily seen from our angle. From other aircraft in the air—I don't know how they would blend in with a fleecy sky."

**Jerome Lederer:** "I would like to comment on that. I understand Beech has been recommending a white top with an international orange bottom. You will find quite a few Bonanzas that way, and the idea there is for increasing the visibility in flight."

**Howard Pember:** "I think against the white sky you still get the shadow effect which you use to identify, but it is in this haze, marginal-visibility condition where there is some additional reflection that in my experience there seems some benefit from it."

**Dave Little:** "This situation is about as broad as it is long. You paint it one way and its fine under one condition, but worse under another. So far as I know at the moment, the best answer is a light on the order of the dorsal fin light now being applied to airline aircraft. This light will be operated day and night."

**Jerome Lederer:** "There is a light being developed by Westinghouse which is supposed to give great visibility in day VFR operations. It's a high-intensity white light."

**Howard Pember:** "We don't have it yet and is it an accurate conclusion that it would be an aid in preventing collisions if all aircraft did put the paint on?"

**Jerome Lederer:** "The pilots would still have to watch. If they don't, there is no point fooling with a bright light or paint."

**Bill Parenteau:** "It has often occurred to me, in the case of those airlines or private aircraft that have been painted white, that if

one extra light were employed on the aircraft i.e., a small flood that would operate from the tail and illuminate the aircraft itself, it could prevent a lot of these so-called close calls in high-density area traffic patterns. Most pilots flying aircraft equipped with de-icer or boot lights put them on when they enter the New York area. Also, they don't just put on their landing lights—they light up the cabin, too, in order that they may be seen by the aircraft that they don't see. I would think that a small spot light on the tail of each plane which would illuminate all-white aircraft, or portions of them that have been painted white, would make them more readily seen by other aircraft. The aircraft the pilot can't see—that's the one he's afraid of."

**Jerome Lederer:** "There is a new light which is being developed and will be ready soon. It won't reflect off the fin or rudder, but it will give a positive very strong light from the top of the fin."

**Bill Parenteau:** "You mean it will illuminate the aircraft itself?"

**Jerome Lederer:** "No, it will be just a very strong light which is better than the light which you get reflected from the airplane."

**Bill Parenteau:** "Well, that goes back to Dave's point: that it's hard to resolve distance from a flashing light, let alone from a single non-flashing light that could be at any distance or perhaps, mistaken for a star."

**Al Ueltschi:** "The thing that concerns me is holding in the area at Flatbush or one of these holding points—holding at 1,000-foot separation. The thing that concerns me is whether everyone's at the right altitude. Two airplanes may be holding the same pattern at 1,000-foot separation on the altimeter. I think we have a potential hazard right there. I'm not condemning traffic control or anything else, but it is very easy to misinterpret the altimeter between 5500 and 6500 on the clock. What's 5 on the altimeter is 6 on the clock. To me that is a potential hazard."

**Sam Saint:** "Al has put his finger on another of our problems. When he says he is worried about traffic holding at 1,000-foot intervals in holding patterns, I think he is pointing to the need for perfecting the radar traffic control that Dave Little talked about a little while back. If we can handle gun traffic the way we hope to with radar, a pilot won't have to hold in these patterns. He'll be brought right in to the airport. The reason he holds today is that the traffic system is not handling traffic properly. Holding in a control stack should be something that is done only in cases where some unexpected breakdown occurs in traffic control. The flow of traffic into a terminal area should be so regulated that a maximum of a turn or two somewhere in a holding pattern is all that is required to get the pilot into the proper interval on approach to the runway."

"You know, Jerry, in this flying business everything is interrelated. We are talking about safety, particularly as it concerns traffic in congested areas, and how do we reduce the possibility of air collisions. We have pointed to radar control as a means of moving more air traffic with greater safety. It



**HOLDING PATTERNS,** said Al Ueltschi, bring up problem of pilots holding right altitude

seems to me that several of the things we have talked about relate in some way to radar control. I've been keeping notes while we've been talking. Maybe it would be worth something by way of summary, Jerry, to point out how a few of these things tie together."

**Jerome Lederer:** "Good idea. It's time to summarize our thinking now anyway."

**Sam Saint:** "Well, I might begin by saying that radar control will not come into its own in a safety sense until we have at least a degree of positive control in our most critically congested areas, and have it 24 hours a day regardless of whether the sky is cloudy or clear. I'd hate to see us pass up the opportunity of emphasizing the need for doing those things which are going to get us toward the happy day when we can handle the traffic on the same basis 24 hours a day without undue economic penalties."

"Bill Parenteau has emphasized the need for positive control in critical areas. Traffic controllers cannot keep track of their air traffic on a satisfactory basis in these critical areas if the scope is cluttered up with a lot of unidentified traffic wandering hither and fro across the scope. I think the traffic controllers will bear me out that eliminating random uncontrolled traffic is one thing that is needed to make radar control effective."

"I think we do need rules to stop uncontrolled flying in the most congested areas. There are probably a half dozen such areas in the country now. I think that we need the new rules, but we've got to realize that we need the cooperation of the pilots, too—airline pilots and non-airline pilots, and controllers. Capt. Ueltschi is certainly correct in emphasizing that point. In the final analysis, the pilot doesn't stay clear of the clouds by 500 feet or 1,000 feet because the book says so. He stays clear of the clouds by what he himself thinks is adequate separation, whether it be 500 or 1,000 feet. That holds good all the way through—for visibility minimums when operating underneath."

(Continued on page 48)

# Skyways Round Table

(Continued from page 47)

"We all know there are times when the Weather Bureau says the visibility is five miles, but actually there are patches in the area where visibility is down to one mile. Most pilots would not operate through that condition without control, but an occasional pilot—an inexperienced pilot who doesn't realize how much traffic is floating around in these areas . . . an occasional pilot will say, 'Well, I'm legal . . . the Weather Bureau says I'm legal.' So he goes barging on through. Airline pilots don't have to be reminded how serious this hazard is, but it wouldn't hurt to point this problem up to the Sunday drivers.

"Let's look at another aspect of the radar control problem (. . . if Jerry will let us look for a moment one step beyond what is immediately available). We have the difficult and very important problem of identification of targets on radars. Twin to this problem is the fact that present-day radars, working on echoes alone, cannot keep operating through rain that is above a certain intensity. The scope gets cluttered with the precipitation echo to the point where the controller must eventually throw up his hands and resort to old-fashioned methods. Those two problems—identification and weather—point to the need for carrying radar beacons in all aircraft to let the controller "see" the airplane through the rain and to let the pilot tell the controller (by coding the beacon reply) which bug he is, crawling across the scope.

"The Air Navigation Development Board through CAA's Technical Development Evaluation Center at Indianapolis, currently is giving high priority to a project designed to solve the technical difficulties and give us a beacon satisfactory for civil use. I think publicity on the need for getting radar beacons into production and into our aircraft is certainly one of the most worthwhile things that any publisher could do.

"One other very important item has been mentioned by Dave Little. Radar is a wonderful thing, but the controller is limited as to the number of airplanes that he can keep track of without his operation becoming marginal. The complexity of traffic control increases much more rapidly than the traffic itself increases. If you've got twice the traffic load, you've got at least four times the complexity. You can show this by simple mathematics. So we are working today on an exponential curve of increasing complexity. And we are on the steep part of the curve—where a large amount of effort is necessary to make even small gains.

"Only a short time back one control frequency handled *all* traffic entering the LaGuardia Airport. Today, you talk first to the Traffic Control Center on one of four frequencies. And you talk to Approach Control on another frequency. On still another channel you listen to radar monitor of your final approach. Finally, you talk to Ground

Control. You've got traffic being handled rapidly from one controller to another.

"The biggest need in tying all these various traffic control elements together today is the interlock and data transfer system that Dave Little mentioned. I think we need some publicity on this particular point. An interlock and data transfer system has been named as a requirement by conferences and committees (SWG-5, Special Working Group 5) of the Air Coordinating Committee. In fact this sort of equipment was first specified by Special Committee 31 of the Radio Technical Commission for Aeronautics. Again, the Air Navigation Development Board has a good project moving under high priority.

"The point is that down at the working level, where the urgency of this problem is understood better than anywhere else, controllers are crying for a faster and better means of passing an airplane from one controller to another. It's like passing the baton in a relay race. You have to make the switch without slowing down. And you can't do it with today's horse-and-buggy method of passing traffic information. It's more than just a communications problem . . . it's a problem of interlocking in that area where the jurisdictions of two controllers overlap.

"We've seen the need for this equipment in the Washington area. I think you all know that an all-out effort to get radar control going in the Washington area is now in full swing. The sad fact is that the Final Approach 'hopper' keeps running dry time and time again for lack of a faster, more positive, and safer method of passing control jurisdiction from controller to controller. Putting it another way, I feel sure that full use of radar control will be limited until we have the interlock and data transfer.

"This was highlighted recently at Washington. Traffic was shut off, that is, all inbound traffic to the Washington area was shut off, for about two hours. Traffic was totally shut off while they drained the log jam out of the air. During that time, the approach control system was operating only to partial capacity—all for lack of an equipment implementation that would get the controller off the hook, take his pencil and his interphone away from him, and let him

**AMERICAN AIRLINES' Dave Little expressed hope for additional Round Table meetings**



operate with positive interlocked data transfer equipment.

"Lest I be taken to task for saying the data transfer equipment is the total answer to this problem, let me hasten to say that another and more immediate approach to this problem is the use of better configuration of airways. CCA, the ANBD, the airlines and the airline pilots are hoping to find short-term relief on this traffic coordination problem by putting up some one-way street signs and some 'no left turn' signs.

"A little way back in our discussion, Huck Smith pointed up another side of this over-all problem. I think we may have missed the significance of what Huck said. He said we have three problems: misinterpretation of instructions, non-adherence to instructions, and inexperience on the part of the pilot . . . and I assume he meant the controller, too. I'd like to say, parenthetically, that an airline pilot accepts a 'clearance' not an 'instruction.' On Huck's three points, I'd like to emphasize another angle; that is, the importance of simplifying the job for the pilots. The pilot after all is a human being . . . and I guess this should apply equally to the controller. We should recognize that these people are human beings and study all possible ways of simplifying their jobs. For example, it's easy to criticize a pilot for misunderstanding a clearance. Maybe we should criticize the fellow who drafted the complicated procedure in the first place.

"To round out this summary, there are items, important items that don't relate to radar control. For example, better lighting of aircraft for night operation—the use of more arrestive warning lights. A program is underway.

"The business of encouraging all pilots to adhere to proper altitudes and to stay on the right side of airways in clear-weather operation, and the need for keeping constant out-of-the-window vigilance are points on which agreement is so complete that we don't generate much discussion. Yet, there may be areas where we can buy more safety for less effort than anywhere else."

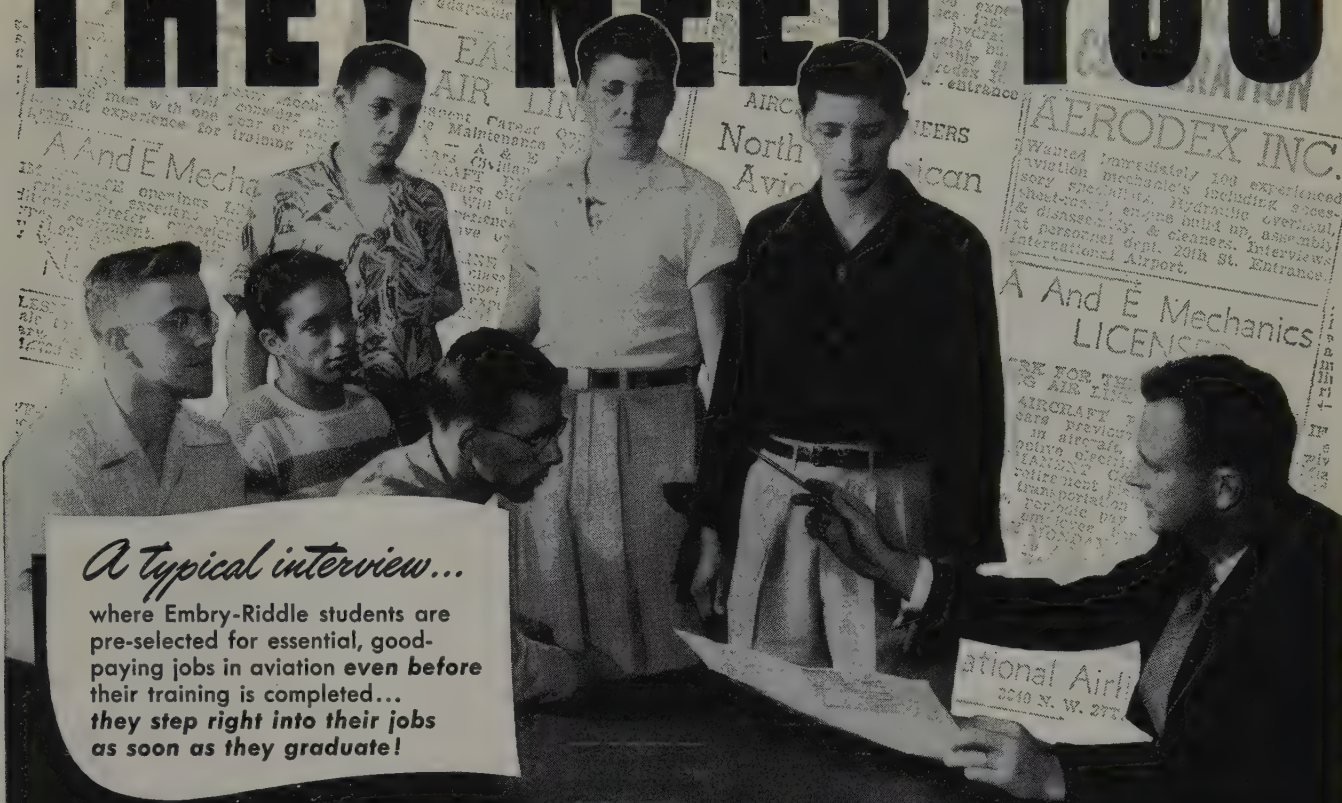
**Norman Smith:** "There is one more thing that I think you should emphasize together with your radar beacon and data transfer programs. That is the need for VHF DF equipment. I think it is very important in our program and should be implemented at the first possible date."

**Sam Saint:** "That was a serious oversight in my little speech. VHF direction finders should certainly not have been overlooked. For one thing, we should be able to get these quickly—at least for the most critical areas. A gadget that points to where a radio voice transmission is coming from is a great aid, especially for a radar controller."

**Dave Little:** "Assuming I am making the concluding remarks on the record, I'd just like to draw in very bold print the word 'Amen' to Sam Saint's and Huck Smith's concluding statements, and thank SKYWAYS and Flight Safety Foundation for an excellent meeting. I'd like to see many more of these."



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**TRAIN IN MIAMI**



**LOADING RAMP** on the 4-0-4 also serves as a tail stand which prevents the tricycle-gear plane from tipping back on the tail in high winds. Built-in ramp eliminates need for portable ramp

## Martin 4-0-4

(Continued from page 17)

stabilizer, which changes attitude with the use of wing flaps. The pilot is relieved of the task of retrimming as he lowers the flaps, since the plane's attitude is gradually changed as flaps are lowered. It is obvious also that stalling speeds would be penalized if that stabilizer were in a rigid position. It is gratifying to report that, even when the stabilizer is not used in coordination with the flap movement, the plane handles well.

The propellers interested me during this flight, because of my many years of test flying airplanes equipped with production and experimental blade configurations and my work with reversing propellers both for ground braking and in flight.

The hydromatic propellers on the 4-0-4 are about the same as those used on the 2-0-2, but those on the plane I flew are controlled almost completely by electricity through the entire range from high to low pitch and in reversing. I found the high rate of pitch change of these three-blade Hamilton Stand-

off gross is 385 fpm. Service ceiling of the 4-0-4, with engines at normal rated power and gross weight of 40,000 pounds, is 29,000 feet. Maximum en route altitude, with one engine inoperative, is 10,400 feet.

This airplane's ability to operate with good payloads into and out of airports is shown in statistics covering take-off and landing field lengths. With gross load, the 4-0-4 will get away over a 50-foot obstacle in 3100 feet. That Martin flap arrangement permits lower touchdown speeds and, with a gross of 38,000 pounds, it will land over a 50-foot obstacle on a runway of 3,565 feet. The braking power of reverse-pitch propellers cuts the actual landing run substantially below certified distances. The plane can operate from small airports at full gross and still meet CAR one-engine-out requirements.

### Airline Service Requirements

I began this article by pointing out that the 4-0-4 comes closer to more of its basic design requirements than almost any other plane I have flown. It may have come closer than any other twin-engine transport ever designed, but not all comparable airplanes have the same basic requirements. Pinning it right down to the 4-0-4, here are the fundamentals set up a few years back for pilots to shoot at: maximum reliability of equipment, intermediate range, in arrangement, compartment, possible, flying all, ease of

fleet of aircraft on ease of economy of compartment, pitch, nature, must have

airframe and landing gear stressed for a heavier gross weight to permit future growth and improvement without subtracting from range and payload during the useful life of the airplane. The operator insisted, too, on structural design to permit the substitution of turboprop engines when they become commercially available.

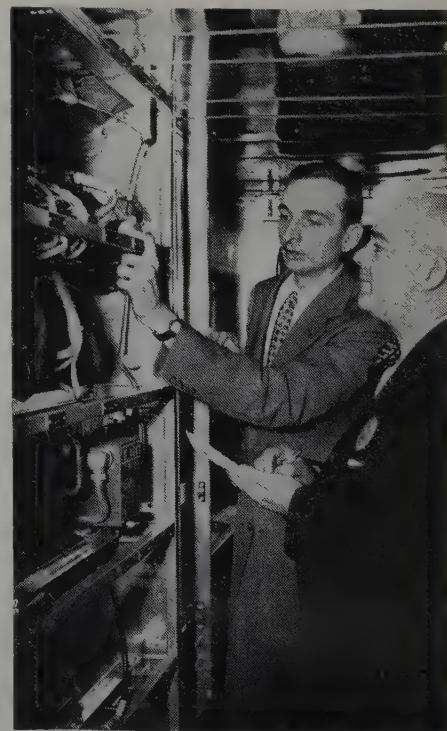
Many of the structural changes stem, of course, from the pressurization requirements. Cabin and belly compartment doors have been beefed up to withstand the pressure. The wings, basically the same aerodynamic configuration as those on the 2-0-2, have been beefed up to carry the loads which will be imposed when turboprop engines are installed. The entire structure is stressed for the increased power, higher gross weights and higher speeds of turboprop installation.

As part of the strengthening process, Martin devised a new wing attachment to the center section. It is a scarf splice that has withstood tremendous loads and far more cycling in static load tests than will ever be required in normal operations. In addition, the landing gear is heavier and stronger to take care of added weight, frequent landings and take-offs in short-haul service.

While I had no opportunity for a detailed examination of the hydraulics system, it appears to be a good one. It is supplied with pressure from the two engine pumps and an electric emergency pump. Emergency brake pressure is supplied by a separate accumulator run off the primary hydraulic system. Aileron boost and wing flap actuating cylinders have been added to the hydraulic system, eliminating the 2-0-2's problem of too much aileron travel for lateral control at low speeds.

The 4-0-4 is pressurized for the best operating efficiency and passenger comfort. Cabin

**RADIO RACK**, shown here with its cover removed, is easily accessible to 4-0-4's crewmen



altitude ranges from sea level at 6300 feet altitude to 8,000 feet at 16,000 feet. Air conditioning, heating, refrigeration and dehumidification are controlled automatically for maximum passenger comfort. Soundproofing and a low noise level engine-exhaust system make this cabin unusually quiet. But there is still a lot to be desired in cabin soundproofing. It is imperative that manufacturers consider every factor in protecting the public from external objectionable airplane noise. Unless noise reduction is seriously considered by manufacturers, the impact can seriously jeopardize aviation growth.

The 4-0-4 has what the designers describe as "passenger appeal." It carries 40 passengers in 10 rows of seats on each side of the aisle. Cabin lighting is about the best I have seen, the seats are of the comfortable reclining type and the interior color schemes are restful on the eyes. In fact, this particular airplane was designed strictly from the passenger-hauling standpoint and not for the corporate purchaser.

Passengers walk up a built-in tail ramp into the 4-0-4 and there is a good-sized baggage rack at the top of the ramp where traveling bags can be stowed. Because it is a tail ramp which drops down from the rear end of the fuselage, the big-hipped passenger like this writer finds little extra room as he boards the plane. The ramp's railing bends inward to cramp those passengers who have not kept their middle age young, as the saying goes. However, this is a passengers' airplane and from all reports they like it.

From the pilot's viewpoint, the radio equipment includes just about everything needed. A quick run-down of my list shows dual Fluxgate compasses, VHF and single HF receivers, dual omni direction finders, dual low frequency direction finders and range receivers, terrain warning indicator, and marker receiver.

The Martin 4-0-4, which uses many of the same components as the 2-0-2 but which is a new airplane, effectively meets the requirements for economical airline operation through a combination of high block speed and large payloads. Low direct operating cost has been the keynote of its design. It has a flexibility that permits competitive operation over many routes currently served by four-engine aircraft, as well as those served by twin-engine transports.

The Martin 4-0-4 will cruise at a speed approximately 100 mph faster than the DC-3 now used by many corporate owners in executive and industrial operations.

Although all 4-0-4 production is earmarked for commercial airlines and none is now available for non-scheduled industrial usage, this evaluation may be of interest to executive and corporate aircraft operators because the airplane sets a relatively high standard of economical operation. Another attractive feature is that it offers maximum flexibility for both short- and medium- distance service. The 4-0-4 represents about the best in short-medium haul airline transportation and, when and if it becomes available, it can offer the same service to the industrial user seeking better multi-engine equipment.

ing better multi-engine equipment.



#### Martin 4-0-4 Specifications

|                          |                  |
|--------------------------|------------------|
| Take-off Weight (max.)   | 44,900 lbs.      |
| Landing Weight           | 43,000 "         |
| Operating Empty Weight   | 30,701 "         |
| Design Useful Load       | 15,774 "         |
| Maximum Fuselage payload | 11,592 "         |
| Fuel Capacity            | 1,350 gals       |
| Crew                     | 3                |
| Passengers               | 40               |
| Cargo & Baggage capacity | 316 cubic feet   |
| Length                   | 74 ft. 7 in.     |
| Height                   | 28 ft. 5 3/8 in. |
| Span                     | 93 ft. 3 3/8 in. |

|   |             |
|---|-------------|
| Wing Area   | 864 sq. ft. |
| Wing Aspect Ratio   | 10.0        |
| Operational Range (40 passengers & baggage & 1,000 lbs. cargo)                      | 925 miles   |
| Maximum engineering range (full fuel, 10,000 ft. alt.)                              | 2,525 miles |
| Level flight High Speed at 14,500 ft. alt., 1,700 BHP per engine, 37,000 lb. gross) | 312 mph     |
| Cruising speed at 18,000 ft., 1,200 BHP per engine, 38,000 lb. gross.)              | 280 mph     |
| Stall speed at sea level (41,000 lb. gross)   | 81 mph      |

# Incomparable

*a pretty girl*



Since the only thing prettier than one pretty girl is two pretty girls, and also since this is the last of our series, we're letting you see double this time. Our twin cowgals are Jean and Joan Jackson, 18, brown-eyed and blonde. They graduated this year from high school where they were twin band majorettes. Jean and Joan like to dance and wear identical clothes. (If you liked our lovely Dallas lasses, how about dropping us a note?).



#### Incomparable

A "Twin Beech"  
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# Corporate Plane TV

(Continued from page 21)

geographic zones, with a minimum distance of 170 miles for VHF channels in Zone I to 220 miles in Zone III. These areas are designated with regard to maximum transmission distances governed by terrain characteristics. Naturally, a station located in flat country will give greater coverage than one located in a mountainous area. The size of the area to be served and the channel assigned will determine power output of the transmitter, variable from one kilowatt to 300 kilowatts for VHF stations.

Further reduction of co-channel interference is accomplished by the carrier-offset plan currently in use in the northeastern United States. This system provides a 10-kilocycle variance in the operating frequency of co-channel stations and results in a substantial reduction of interference, permitting higher power output.

Best suited for the DC-3 is a rectangular 17-inch picture tube, sufficient in size to allow a good view to all passengers from any seat location. It is suggested that the receiver be mounted in the forward bulkhead, eliminating the mass of the unit in the cabin proper. Suitable shockmounts must be provided and care be given to fastening the picture tube securely to the chassis. The existing safety glass should be retained or substituted with the available front panels incorporating this feature which lend themselves to simple installation.

The installation shown in the photograph was made using an Admiral 17-inch receiver which was built into the cabin conversion by Aero Corporation in Atlanta, Georgia; electrical wiring, antenna and loudspeaker installation was completed at Atlantic Aviation Corporation, Teterboro, N. J., together with the custom radio installation.

Audio output of the receiver was found sufficient to drive a multiple loudspeaker arrangement, located to obtain complete cabin coverage. As with any cabin radio, primary consideration should be given to the type and location of the loudspeakers to obtain sufficient sound distribution above the normal cabin noise level. Speaker size should be of at least six-inch diameter for good reproduction and, depending on the cabin interior, four to eight loudspeakers installed for even coverage with maximum efficiency. Proper phasing of the loudspeakers is mandatory, otherwise canceling action will take place, lowering the effectiveness of the audio system. Four watts of audio power are sufficient to drive such a system in most interiors, eliminating modification of the receiver for additional audio output.

Power input to the receiver is 115 volts, 400 cycles, supplied by an MG-149F inverter. There was concern about the higher frequency supply causing excessive hysteresis and eddy current losses, but experiments proved that the existing power transformer, while designed for operation on 60 cycles, was not affected. This may not be true with

other types of receivers and it is suggested a replacement transformer designed for 400-cycle operation be utilized. However, avoiding this modification, if practical, enables the unit to be repaired at any service facility. Inverters are available furnishing 60-cycle A.C. but the weight and cost factors of a unit large enough to power the receiver make it objectionable, more so when the other supply is already available powering other equipment in the aircraft.

The A.C. input to the receiver should be fused to prevent damage to the power supply in event of failure of the receiver. If high-altitude operation is anticipated, circuits that may cause arcing should be fused. Several TV manufacturers incorporate fuses in the high-voltage circuits as standard production, preventing extensive damage to other parts in event of a component failure. The high-voltage lead to the anode of the cathode ray tube should be routed clear of any low-potential objects that could cause arc-over.

Many variations have been seen on aircraft TV antennae, comprising long-wire systems susceptible to icing and detrimental to the external appearance of the aircraft. Two factors governed the antenna system incorporated in the photographed installation; the necessity of good performance and clean physical characteristics.

Comparison of the type of signal to be received from high-powered, elevated TV installations to that of low-powered omniranges eliminated any doubt of what the results would be. We elected to modify an AS-27A "Ram's Horn" antenna, lengthened for optimum performance on the low TV band. Best transmissions and programing influenced this decision. Characteristically, this antenna was designed with directional features that are not desired for this system. For the most part, flights are to and from major cities, but somewhere enroute we may want reception from stations to the side of the course, and the directional antenna would alter our performance. By bending the elements outward, similar to Aircraft Radio Corporation's A-13B omni antenna, and eliminating the Glide Slope section, we diminished the directional

quality to the extent where the field pattern is almost omnidirectional, with only slight loss on the side. Performance on high frequency channels proved satisfactory. This was not surprising as the power of TV transmissions will overcome slight mismatches and losses.

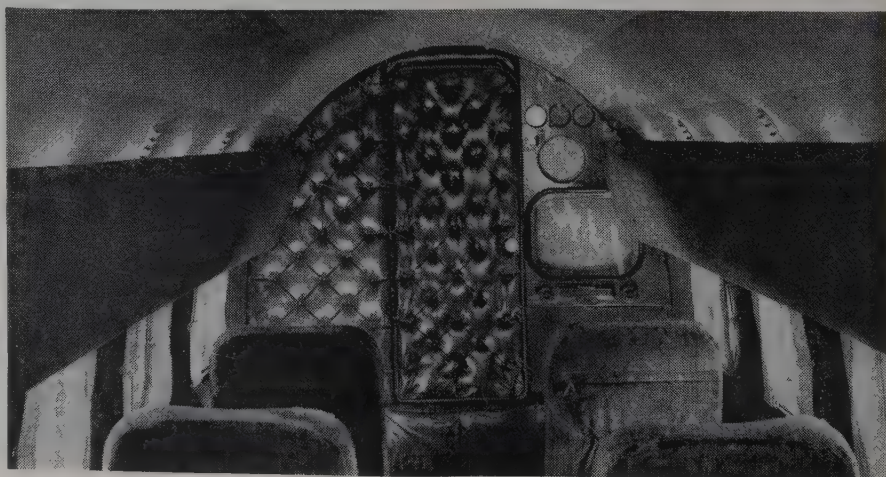
With few exceptions, most receivers are designed to function with a 300-ohm antenna and transmission line. Included in our antenna was the addition of an impedance transformer to match the low impedance antenna to the 300-ohm transmission line. This unit is available commercially for home TV usage and was incorporated in the base of the antenna. This eliminated any experiments with matching sections which would reflect in higher installation costs. Most impedance transformers operate with a small loss, but the drop in signal here is compensated by the gain resulting from proper matching of this system. The antenna is located at a forward position for reduction of lead-in length and minimum loss from this source. Engine and propeller interference was not experienced at this location. To reduce the possibility of internal interference from the electrical system of the aircraft, shielded transmission cable was installed. Federal Telephone and Radio Corporation manufactures a cable suited for this purpose. Type K-111 is a shielded, twin-conductor, 300-ohm assembly which may be used, but caution is emphasized to keep the length at a minimum as there is relatively high loss in this cable as compared with ordinary 300-ohm line.

It may be practical in some aircraft to remotely locate the picture tube from the receiver due to installation problems. However, this would involve modification of the receiver wiring and high voltage leads to the tube.

With the high expenditure on radio systems in aircraft, the TV receiver represents a small fraction of the total cost justified by the pleasure and satisfaction of the passengers. Unfortunately, provisions have not been made as yet for instrument panel repeaters for the crew, but that is an anticipated request.



**LODESTAR** owned and operated by Lear, Inc., also features a TV installation. The set is mounted on the bulkhead, its speaker just above the TV screen. Visibility is good at all seats



# Automatic Flight . . . F-5

(Continued from page 27)

Island. The plane retains its respect for manual control, but the F-5 takes over when the controls are released.

As we sped past Staten Island, we allowed the F-5 to put us in an effortless bank to the east that would take us out over the ocean. At this point we tuned in the Idlewild localizer and settled back to await the next move. A few minutes later we were a few miles south of Idlewild and crossing the ILS beam from runway 31. Here we pushed the button modestly marked "Automatic Approach."

Again the F-5 took us into a graceful bank to the left. We swung 45° to the left of the runway line, rolled gradually back to about 10° to the right and then settled down on a bee-line course for the end of the runway. Easing the throttles back to obtain a 120-mph airspeed and with flaps and wheels down, we sat back and relaxed, soon to find ourselves five feet off the runway about 15 feet from the center line and about 100 from the end in a perfect position for landing.

Four times we let the F-5 take us down, and four times we settled gently into the cluster of black tire marks left by previous flights of scheduled overseas and domestic flights. There were no violent maneuvers. It was as though we were coasting down an immense toboggan slide.

It should be mentioned that no provisions are made for automatic speed or throttle control. The reason for this omission is somewhat amusing. We learn that a great deal of research in automatic flight and automatic approach systems proved that *completely* automatic control is frustrating to the veteran pilot. He rebels against having nothing to do and he becomes nervous just sitting there watching the instruments and having his autopilot do all the work. So that function has been left for him. It spares him the sensation of being excess baggage.

Crosswinds, regardless of velocity, are a breeze for the F-5. During our flight there was a healthy 25- to 30-mph wind from the northwest with gusts of 500 to 1,000 fpm. Other flights in and out of Idlewild were using a runway almost perpendicular to ours, but the *Lodestar* maintained a neat 15° crab and seemed completely to ignore the gusts and over-the-water turbulences.

The smoothness maintained by the F-5 can be attributed to a system of electronic integration or averaging that is built into the autopilot. When intermittent discontinuities occur in the ILS signals during an approach, as they often do, the F-5 ignores them and guides the plane according to the average information that is received. So thorough is this integrating process that if the ILS transmitter should fail completely during the last stages of an automatic approach, the autopilot will continue on toward touchdown as though nothing had happened.

It is significant to note that the F-5 is capable of this averaging process and yet it

has the ability to anticipate displacements and compensate for them almost before they occur. To move an aircraft in space an acceleration must be imparted. By tying control to acceleration instead of displacement, the F-5 can prevent displacement by applying compensating control before the displacement occurs.

Three responsibilities are assumed by the F-5, eliminating pitch, roll and yaw. To maintain a check on these three phenomena, the F-5 electronically "looks at" the vertical and directional gyros and senses deviations from the attitude selected for the plane by the human pilot.

For example, in the case of direction, the autopilot watches the directional gyro. When some external influence causes the plane to deviate from its set course, a minute electrical signal is generated showing the autopilot that some error has occurred. This weak signal is electronically amplified and modified to take the form required by electric motors that operate the plane's rudder and return it to the preset heading. Pitch and roll functions are similarly guided by reference to the vertical gyro.

When tied in with the ILS system, another

## AIR SAFETY

**A leading insurance company  
rutes these extra premiums per  
\$1,000 of insurance: Airline pilot—  
\$2.50; House Painter—\$2.50;  
Bridge Painter—\$5.00; Railroad  
Detective and Watchman—\$5.00.**

set of electrical signals is combined with information provided by the plane's gyros. The radio signals emitted by the ground ILS transmitter are electronically modified and applied where they add to or subtract from the gyro signals in such a way that they move the plane's control surfaces to guide it down the chute.

Much of the reticence to automatic flight is due to pilots' fear that something might go wrong with the plane in such a position that manual recovery might be impossible. The F-5 combats this fear in two ways. First of all, the components used are carefully tested and specially manufactured to reduce the probability of equipment failure to an almost negligible minimum. Secondly, the electronic circuits are so designed that the most common failures, such as normal tube failures, will not cause complete failure of the system.

From an electronics standpoint, the design of the F-5 represents genius in its most refined form. Maximum attention has been paid to serviceability. For example, most of the assemblies that go to make up the complicated electronic hookup are of the plug-in variety, thus requiring only minutes for average trouble-shooting. Many of the sub assemblies are directly interchangeable, so that stocks required at repair bases are small. An innovation almost unheard of in electronics circles is the use of only one type

of tube, so that tube replacement is like changing bulbs in a Christmas tree string.

The F-5 autopilot can be used on any plane from a B-36 intercontinental bomber to a single-engine Beechcraft *Bonanza* with equal success. It takes over at the point in the airplane's control system where the human pilot applies his efforts in manual control. Since planes are designed for average physical ability, no changes need be made for different size planes.

The available power from the autopilot control motors is roughly one third that of the average human pilot, and relatively little effort is required to overpower the F-5. Automatic trim is built in, and when switching from automatic flight to manual, the transition is unnoticeable, since the trim doesn't change.

As a step toward economy of space and weight, a single amplifier is used for automatic altitude control in cruising and altitude control in automatic approach, since these two functions are never used simultaneously.

The F-5 is designed to withstand extremes in temperature, pressure, shock and vibration. It operates equally well in humid tropical climates and sub-zero temperatures at 45,000 feet. In one series of tests an F-5 was mounted a few inches from a machine gun. After firing 10,000 rounds from the gun, the autopilot behaved in its usual precise manner.

Building such performance into a piece of delicate electro-mechanical machinery is not easy—nor is it cheap. The F-5 accomplishes substantially the same functions as the L-2, and yet it costs \$10,000 more. The F-5 costs \$13,750, plus about \$2,000 for the automatic approach coupler and at least \$1,000 for installation. For quantity users the price drops slightly.

At the present time there are 13 bases in this country equipped to install F-5 automatic pilots. It is, of course, advantageous to install the F-5 when the plane is built, but it is possible to add one at any time after the plane is built.

Automatic flying with the F-5 is obviously nowhere in the cards for the Sunday pleasure pilot who must be concerned with costs. However, its high cost would not be a deterrent in the majority of executive and corporation planes. In most cases, the \$3,000 L-2 will suffice, but where the ultimate in reliability and dependability is essential, as in executive operations, regular commercial service and military planes, the extra cost is easily justified. One missed approach by a multi-passenger airplane could cost the operator more than 100 F-5's.

According to inventor and chief demonstrator Lear, ceiling and visibility minimums could be safely reduced to 100 feet with  $\frac{1}{4}$ th mile, or ceiling obscuration and  $\frac{1}{4}$ th mile. By the end of the current year, 154 of the country's major air terminals are expected to be ILS equipped, and with the F-5 autopilot, this means 154 destinations that can be reached safely and surely with precision virtually impossible to duplicate by means of manual control.



# British Aircraft

(Continued from page 25)

gallons per hour, including take-off and climb. At maximum weak mixture cruise the true cruising speed is better than 190 mph. Single-engine performance was found to be satisfactory at all loadings, and the stall and landing characteristics are particularly good. The manufacturer's specifications are:

**Manufacturer:** de Havilland Aircraft Co. Ltd., Hatfield, England.

**Aircraft:** *Dove*. Twin-engined low-wing monoplane with tricycle undercarriage. Fitted with two de Havilland *Gipsy Queen* 70-4 engines of 340 T/O hp each.

**All-up weight:** 8500 lbs.

**Fuel capacity:** (U.S.g.) Standard-156. w/extra tanks-202.

**Span:** 57 ft.

**Length:** 39 ft. 6 in.

**Wing area:** 335 sq. ft.

**Wing loading:** 25.3 lb. sq. ft.

**Cabin capacity:** 246 cu. ft. Front locker: 22 cu. ft. Rear: 67 cu. ft.

**Maximum speed:** 210 mph at 8,000 ft.

**Stalling speed** (landing condition): 72 mph.

**Take-off safety speed, one engine out:** 95 mph.

**Rate of climb at S.L., one engine out:** 230 fpm.\*

**Max. weak mixture cruise:** 200 mph at 8,000 ft.

**Consumption at m.w.m.c.:** 42.5 U.S.g. per hr.

**Cruise at 50% power:** 164 at 8,000 ft.

**Consumption at 50% power:** 27 U.S.g. per hr.

**Take-off distance from rest to clear 50 ft. at safety speed and full load:** 2,370 ft.

**Landing distance from 50 ft. to rest:** 2,250 ft.

**Flaps and undercarriage operation:** Pneumatic.

**De-icing system:** T.K.S. fluid.

(\*Rate of climb, one engine out, is in clean condition and propeller feathered)

## de Havilland Heron

This four-engined aircraft is a direct descendant of the *Dove*. The prototype first flew in May, 1950, and production is now going ahead. It was designed specifically for feeder-line operations where excellent take-off and landing characteristics, combined with safety, economy and simplicity, were of primary importance. Maintenance has been reduced to a minimum, and many *Dove* parts are used. The engines are unsupercharged *Gipsy Queen* 30's. The first production models have a fixed undercarriage to suit those operators who are really out in the blue and whose stage lengths and local maintenance facilities are minimal, but the retractable landing gear version is due to fly soon. Designed to meet the ICAO International Transport Category "A" recommendations, there are already over 30 of these aircraft on order and the first deliveries have been made. Provided the rearmament program allows it, an executive version of this aircraft, with the retractable undercarriage, should be available by the middle of next year. Such a version could have accommodation for eight persons, each in arm chairs facing each other in pairs, and

with folding tables between. Arrangements can be made to purchase the aircraft without any interior appointments. Thus, the American purchaser could have the interior cabin design and installation done in the U.S. by his appointed aircraft service operator.

The manufacturer's specifications are:—

**Manufacturer:** de Havilland Aircraft Co. Ltd., Hatfield, England.

**Aircraft:** *Heron* Series I. Four-engined low-wing monoplane with fixed tricycle undercarriage.\* Fitted with four de Havilland *Gipsy Queen* Series 30 unsupercharged engines of 250 T/O hp each.

**All-up weight:** 12,500 lbs.

**Fuel capacity:** (U.S.g.). Standard: 245. w/extra tanks: 380.

**Span:** 71 ft. 6 in.

**Length:** 48 ft. 6 in.

**Wing area:** 499 sq. ft.

**Wing loading:** 25.0 lb. sq. ft.

**Cabin:** 19 ft. 6 in. long x 5 ft. 8½ in. high.

**Rear locker—**105 cu. ft. **Front locker—**24 cu. ft.

**Maximum speed:** Approximately 178 at S.L.

**Stalling speed** (landing condition): 71 mph

**Take-off safety speed, one engine out:** 91 mph

**Rate of climb at S. L., one engine out:** 595 fpm (Flaps up, propeller windmilling)\*

**Max. weak mixture cruise:** Approx. 174 mph at 2900 ft.

**Consumption at m.w.m.c.:** Approx. 63 U.S.g. per hr.

**Recommended cruise at 65% power:** 165 mph at 8,000 ft.\*

**Consumption at 65% power:** 50.5 U.S.g. per hr.

**Take-off distance from rest to clear 50 ft. at safety speed and full load:** 2,055 ft.

**Landing distance from 50 ft. to rest:** 1,995 ft.

**Flaps and undercarriage operation:** Pneumatic.

**De-icing systems:** Goodrich & T.K.S.

(\*Series II *Heron* with retractable landing gear should have 20-mph increase in cruising speed; increased range for long-distance version of 125 miles; and improved engine-out climb from 595 fpm to 700 fpm.)

## Handley Page Marathon

The *Marathon* Mark IA is an all-metal high-wing monoplane, fitted with four de Havilland *Gipsy Queen* Series 70-4 engines (as are fitted to the *Dove*), and with an all-up weight of 18,000 lbs. Although rather larger than any of the other types described here, it is a machine that should certainly be considered by those companies who need an executive aircraft with plenty of room, but who are looking for economy of operation and maintenance. Originally designed by the Miles Aircraft Company Ltd. of Reading, England, to meet the Brabazon-Type V specification, this machine flew in the Spring of 1946. A short time later an order for 40 aircraft was placed by the Ministry of Supply. In June, 1948, the Miles Aircraft Company was taken over by Handley Page Ltd., a company that has been associated with aircraft construction since the earliest days of aviation. Work on the *Marathon* was pushed ahead. The aircraft was subjected to full

flight tests by the British Flight Testing and Experimental Establishment at Boscombe Down, on Salisbury Plain, and in 1950 extensive demonstration tours were made to both Australia and South Africa. As a result of these tours, *Marathons* were ordered by West African Airways and Union of Burma Airways. The British RAF also have some 30 on order as navigational trainers.

Because it was designed as an 18-seater, there is plenty of room in the cabin for an imaginative executive layout to seat at least 10 or 12 people, complete with steward and galley and toilet facilities. The standard production models embody cabin air conditioning with thermostatic control. In reporting on this aircraft, the Foreign Survey Group of the CAA Prototype Advisory Committee, said: "*The airplane performed well in demonstrations even on two engines with the loading existing during [the flight]. The ground-handling characteristics were very good.*"

A further interesting development associated with this machine is the development of the Mark II version powered by two Armstrong Siddeley *Mamba* propeller turbines of 1,320 shaft horsepower each. This aircraft has done a considerable amount of flying and, although still in the development stage, it seems possible that the progress made with the piston-engined Mark I version might lead to a production version of the Mark II at some future date. If so, it will be an aircraft worth watching. The manufacturer's specification for the Mark IA are:—

**Manufacturer:** Handley Page Ltd., Reading, England.

**Aircraft:** *Marathon* IA. Four-engined high-wing monoplane with tricycle twin-wheel undercarriage. Fitted with four *Gipsy Queen* 70-4 engines of 340 T/O hp each.

**All-up weight:** 18,000 lbs.

**Fuel capacity:** (U.S.g.) Standard: 265. w/extra tanks: 335.

**Span:** 65 ft.

**Length:** 52 ft. 3 in.

**Wing area:** 498 sq. ft.

**Wing loading:** 36.14 lb. sq. ft.

**Cabin capacity:** 760 cu. ft. Cargo (two compts.)—229 cu. ft.

**Maximum speed:** 226 mph at 10,000 ft.

**Stalling speed** (landing condition): 84.5 mph (approx.)

**Take-off safety speed, one engine out:** 104 mph.

**Rate of climb at S.L. one engine out:** 420 fpm.\*

**Max. weak mixture level speed:** Approx. 211 mph at 9,000 ft.

**Max. range weak mixture cruise:** 840 miles at 10,000 ft. (with extra tankage)

**Cruise at 50% power:** 157 mph at 10,000 ft.

**Range at max. range conditions:** 1,030 miles (with extra tankage)

**Take-off distance from rest to clear 50 ft. at safety speed and with full load:** 2,760 ft.

**Landing distance from 50 ft. to rest:** 2,373 ft.

**Flap and undercarriage operation:** Oleo-pneumatic.

**De-icing systems:** Thermal or Goodrich.

\* Rate of climb, one engine out, is in clean condition and propeller feathered)

## The Percival Prince

In the writer's opinion, the twin-engined Percival *Prince* offers an aircraft-engine combination of very considerable interest. It is an airplane which appears to have a sufficiently good basic performance, ruggedness of construction and adequate cabin accommodation to give it 'stretch' over the years to come. A twin-engined (two Alvis *Leonides*) high-wing design with an all-up weight of 11,000 lbs., the prototype first flew in 1948, and its British Certificate of Airworthiness in the Normal Category was granted in December, 1949. Since that date, a considerable number of *Princes*, designed to meet a variety of needs, have been sold all over the world. The British Royal Navy employ the *Sea Prince* as a flying classroom and as a communications aircraft. An eight-passenger communications version is used by the British Royal Navy in Washington. The Royal Air Force have some on order, and others have been sold for survey and passenger work. Not unnaturally, there has been steady improvement in the original version, and the new 1952 *Prince* Mark III is undergoing final Certificate of Airworthiness tests in order to obtain its ICAO Transport Category Class 'A' classification. (As this is the version in which executive owners might be interested, the Mark III specifications are given below).

Although one or two of these aircraft have passed through the States on their ferry flights across the Atlantic and down to South America, not many people have had the opportunity of seeing the aircraft itself. Those who have seen it have been impressed by the roominess of the cabin, the size and layout of the pilot's cockpit and, above all, by the size of the double-opening cabin door which provides an entry of 50 ft. 2 in. x 4 ft. 2 in. when fully open. Because company aircraft may well be called into service for occasional cargo work of an emergency nature, this is an excellent feature. As with the other British postwar designs, special attention has been given to maintenance.

The powerplants of the *Prince* are not as well known as those of the other four aircraft described here, so a brief specification of the Alvis *Leonides* 502/4 engine may be of interest. This is a nine-cylinder radial, supercharged and with direct injection and of standard design and proved reliability. Its construction began in England in 1935, and it is the only modern engine of this type in the 500/600-hp class. The swept volume is 718.6 cubic inches, and it has a take-off power of 540/560 hp and a maximum power rating of 570 hp at 1,750 feet. It is in wide use in the Royal Air Force on training aircraft, as well as being the power unit for most of the new British helicopters. It seems likely, therefore, that this engine will play an increasingly important part in British developments. The manufacturer's specifications for the *Prince* Mark III are:—

**Manufacturer:** Percival Aircraft Ltd., Luton, England.

**Aircraft:** *Prince* Series III. Twin-engined high-wing tricycle monoplane. Double nose

wheel. Fitted with two Alvis 9 cylinder radial engines, of 550 T/O hp each.

**All-up weight:** 11,000 lbs.

**Fuel capacity:** (U.S.g.) Standard: 208. w/extra tanks: 271.

**Span:** 56 ft.

**Length:** 42 ft. 10 in.

**Wing area:** 365 sq. ft.

**Wing loading:** 30.1 lbs. sq. ft.

**Cabin capacity:** 489 cu. ft. Baggage compartment—72 cu. ft.

**Maximum speed:** 229 mph at 5,000 ft.

**Stalling speed (landing condition):** 75 mph

**Take-off safety speed, one engine out:** 110 mph

**Rate of climb at S.L. one engine out:** 340 fpm\*

**Max. weak mixture cruise:** 5,000 ft.—178 mph; 10,000 ft.—190 mph

**Consumption at m.w.m.c.:** 5,000 ft.—50 U.S.g. per hr; 10,000 ft.—52.7 U.S.g. per hr.

**Speed at 26" and 2200 rpm:** 159 mph at 10,000 ft.

**Consumption at above power:** 37 U.S.g. per hr.

**Take-off distance from rest to clear 50 ft. at safety speed and with full load:** 2400 ft.

**Landing distance from 50 feet to rest:** 2,580 ft.

**Flaps and undercarriage operation:** Pneumatic.

**De-icing system:** Goodrich and fluid.

(\* Rate of climb, one engine out, is in clean condition and propeller feathered.)

## The Short Sealand

"The firm of Short Brothers, which is the oldest established firm of aircraft designers and producers in the United Kingdom, was founded by the brothers Eustace and Oswald Short in 1898, their work for some years being in the manufacture of spherical balloons." That is what Jane's "All the World's Aircraft" says about them. But this company is perhaps more recently, and certainly more widely, known for its successful history in the development of the flying boat, both civil and military. It is not surprising, therefore, that after the war they turned their attention to designing and building a small amphibian, and in 1948 introduced the *Sealand*, an all-metal twin-engined amphibian flying boat suitable for the executive or private owner, for taxi work or military communication. (The Indian Navy has ordered 10 for this work.) This aircraft has an all-up weight of 9100 lbs., and the original model was fitted with *Gipsy Queen* 70-2 and -3 engines. Recently, however, consideration has been given to fitting *Gipsy* 70 Mark 2 engines, and this modification, together with other refinements which have been embodied as a result of operational experience, should result in an improved all-round performance. The figures given below, therefore, refer only to the earlier Mark numbers, and not to the aircraft that might be available for the American market. A pure flying boat version of the *Sealand* is also available which, because of the omission of the undercarriage structure, shows an increase in payload of some 1700

lbs. The removal of the undercarriage from the amphibian version is a simple matter and gives a saving of some 500 lbs. of weight.

The executive model of the *Sealand* is particularly well fitted out, with seating for four or five passengers in very comfortable reclining chairs, together with tables, baggage racks and toilet facilities. The fitting of de Havilland *Gipsy Queen* 70-3 engines and de Havilland fully reversible propellers, combined with the manufacturer's knowledge and experience of hull design, has resulted in an aircraft with excellent water-handling qualities. The manufacturer's specifications for the current production model of the Short *Sealand* are:—

**Manufacturer:** Short Bros., Rochester, & Short & Harland, Belfast.

**Aircraft:** *Sealand*. Twin-engined high-wing amphibian flying boat fitted with two de Havilland *Gipsy* 70-3 engines of 340 T/O hp each.

**All-up weight:** 9100 lbs.

**Fuel capacity:** (U.S.g.) 144. w/extra tanks: 212.

**Span:** 61 ft. 6 in.

**Length:** 42 ft. 11 in.

**Wing area:** 358.6 sq. ft.

**Wing loading:** 24.4 lbs. sq. ft.

**Cabin capacity:** 326 cu. ft. Baggage compartment: 84 cu. ft.

**Maximum speed:** 185 mph at 5,000 ft.

**Stalling speed (landing condition):** 68 mph

**Take-off safety speed, one engine out:** 98 mph

**Rate of climb at S.L. (prop feathered, flaps, gear up):** 137 fpm

**Maximum weak mixture cruise:** 170 at 6600 ft.

**Take-off distance to clear 50 ft. at safety speed, full load:** Land—3,090 ft., water—3600 ft.

**Landing distance over 50 ft. to rest:** 2,460 ft.

**Flaps and undercarriage operation:** Electro-hydraulic.

## ... and Price?

It will be noted that in this article no mention has been made of the American price, or of radio equipment. This is intentional. The price of any aircraft depends so much on the equipment and fittings required that there can be wide variations, and to give a definite figure in an era of ever-rising costs might also be misleading. But because production costs in England are lower than in the States, and with the present favorable exchange rates, the prices of all the aircraft mentioned are probably lower than any equivalent American types.

As to radio, here again every purchaser has his own particular needs and ideas, and although all these aircraft can be supplied with very excellent British radio, both MF and VHF, the customer generally likes to make his own choice.

In case more information is required, however, the address of each manufacturer has been given, and any letter with an American airmail stamp on it is certain to get priority with the Sales Manager and an immediate reply to questions will be the order. Literature is readily available to all interested parties.



# Maintenance of the DC-3

(Continued from page 31)

of nacelles, check cables, conduits, plumbing bungee covers, gas strainers, etc., in nacelles, oil tanks for leaks, security and condition.

A visual inspection of all cowling should be made for condition and security. One large center piece of the cowling should be removed (from each engine) and checked for oil and gas leaks and general condition. The prop hub and dome should be inspected for leaks, and blades for nicks and cracks. Check de-icer slinger, tubes and hose.

All instrument lights, navigation lights and flashlights should be checked, and if any part of flight is to be made after dark, all lights should be in operating condition.

All circuit breakers should be checked for proper setting (C&S DC-3's have 24-volt system, with all circuit breakers and no fuses).

Pitot static heads checked—turn pitot heaters on, check warning lights. The current used should indicate within normal range, and amperage should go to the high side, then drop back as the pitot tube heats up.

Check the landing gear warning system by closing the throttle and moving the landing gear handle out of neutral position. The

warning horn should blow, and red light come on.

The fuel-gauge operation is checked by moving selector handle to each tank. Wind both clocks, but do not overwind.

A visual inspection should be made of the CO-2 bottle indicators to be sure it has not been accidentally discharged. (1) Tell-tale on top of bottle should be out. (2) Plug-in emergency discharge line below copilot's side window should show red disc.

Check hydraulic-system fluid level, taking into consideration pressure reading; check de-icer fluid tanks and fill to correct level; tool kit for proper tools—pliers, screw driver and file, and safety of box lid. Oxygen equipment should be checked for security and condition.

All engine and flight controls must be checked for free movement and full travel.

Seats, seat belts should be checked for operation and condition; the airplane generally checked for any loose or open inspection plates and compartment doors.

## Engine Run-up

Prior to flight time, engine performance should be checked:

|                   |                      |
|-------------------|----------------------|
| RPM               | De-icer wing         |
| Manifold pressure | Carburetor heat rise |
| Oil pressure      | Vacuum pump suction  |
| Fuel pressure     | Harness pressure     |

Head temperature  
Prop operation  
Ignition check  
Generating volts  
Generating amps  
De-icer carb  
De-icer prop

Hydraulic pressure  
Test wing flaps  
Test cowl flaps  
Brake operations  
Prop feathering  
Test fire warning

Before being dispatched on a flight, the ship should undergo a final check out, with:

Ignition switches off  
Mixtures idle cut off  
Brakes set  
Fuel valves off  
Battery cart on  
Oil radiator heat Hot Cold  
Carburetor heat Hot Cold  
Prop controls low pitch  
Fletner position normal  
Hydraulic pressure 500 pounds  
Cowl flaps open closed  
Generator field switch off  
De-icers off: Wing, Carb, Props, Wind-shield  
Landing-gear handle down  
Flap handle up  
Star valve safetied closed  
Two cockpit towels  
Pilot's flashlights in holders  
Hydraulic pump, vacuum pump (L) (R)  
Control surfaces blocked and signs in place  
Log book in ship

## Engine Uncowled After 75 Hours

After 75 hours in flight, the ship should undergo a more thorough inspection, following the aforementioned visual checking and, in addition, the engines should be uncowed. Two mechanics should be able to complete the inspection as outlined below in an eight-hour period.

Remove skirt and ring cowling for better inspection of the engine. Clean cowling and repair, if necessary, before re-installing.

Clean cuno, check for: foreign material, turning of cuno mechanism. Wash and re-install.

Remove magnetic sump plug and check for foreign material, wash and re-install.

Check Carefully:

Engine mount for cracks: mount bolts for signs of looseness and safety; skirt-cowling supports for tightness and cracks.

Firewall for cracks; all fittings through firewall tight; all tank-fitting clearances.

Engine sections for cracks or signs of looseness or oil leaks and general condition.

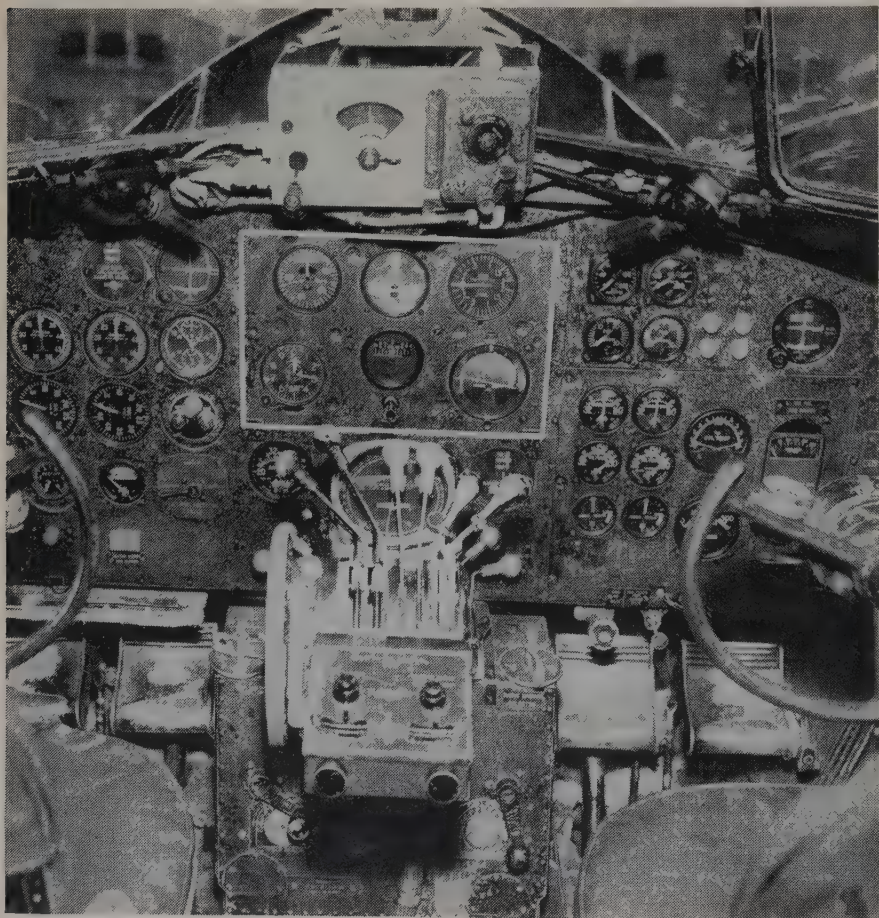
Carburetor and adaptor for security; all linkage tightened and safetied; plugs safetied; control pulleys tight and safetied.

Generator and starter for tightness; bands tightened and safetied; leads tightened and safetied.

Magnetos for tightness; seal blocks tightened and safetied; harness general condition; manifold tight; harness leads condition and tightness, magneto blast tubes for clearance and security.

Vacuum pump and hydraulic pump for security; all the lines for clearance and the hose connections tightened; hydraulic-line nipples safe-tied.

**FEATURE** of C&S DC-3 maintenance is installation of quick-change flight panel (outlined in white). Calibration of all flight instruments is checked after each 150 hours of flight operation



Fuel pump for security; adjusting nut tight and safetied; drain line clear; fuel lines clear and secure; hose secure.

Harness pressure pump for security; fittings and plugs for security and lines for condition and clearance.

Pressure harness with flowmeter to determine amount of air leakage; check silica gel color and replace if gel has turned pink or white.

Tachometer magneto and conduit connection for security.

Oil radiator for dents, or signs of leaks; support for cracks; air scoop for cracks and general condition; control linkage for excessive play.

All plumbing and cowl-flap lines for condition, clearance and support.

All electrical conduits for clearance; knurl nuts tightened and cannon plugs for security and safety.

All engine control cables for signs of wear; pulleys for free operation; turnbuckles and fittings and safety.

All engine controls for full travel; freedom of operation and safetizing.

Prop feathering switch in cockpit to see that it holds in, and then release immediately. Feather and unfeather prop through complete cycle.

Check to see that booster coil buzzes normally and primer solenoid clicks.

Look for alcohol leaks (from firewall to carburetor) with system under pressure.

Start auxiliary fuel pump; move mixture control to Auto Rich momentarily and then to Idle Cut off and check all fuel lines, connections and fittings from firewall to carburetor to fuel leaks.

Heat deflector baffle for cracks; broken dzus springs; chafing strip and support brackets for security. Check CO-2 line for clearance, security; fittings secure and general condition.

Cowl flaps for condition; linkage for excessive play; supports and brackets for security and cracks; cowl-flap cylinder for leaks.

Complete exhaust stack for security, cracks, evidence of exhaust leakage; slip joint for wear; tail pipe for cracks and burned spots.

Intake pipes for signs of leakage; flange, cap screws secure; packing nuts secure.

Rocker box covers for wear from speed rings; signs of oil leaks; push rod housing and hose for oil leaks.

Cylinders for signs of looseness at base; cracked fins; cap screw safeties; cylinder baffles for condition and security; thermometer couple leads and bracket for security.

Carburetor air scoop for cracks, loose rivets, broken dzus fasteners; rubber seal and asbestos heat deflector for condition; heat valve for free operation and stop pins for security; alcohol lines and fittings for signs of leaks and security.

Prop governor for security, oil leaks, excessive play in control shaft; feathering line for clearance and leaks.

Prop blades for nicks and cracks; prop dome and blade seals for leaks and dome

for safetizing; de-icing slinger for condition.

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Skirt cowling for general condition, cracks, loose rivets, broken side rails, broken or loose dzus fasteners; installation of skirt cowl for fit and dzus button security.

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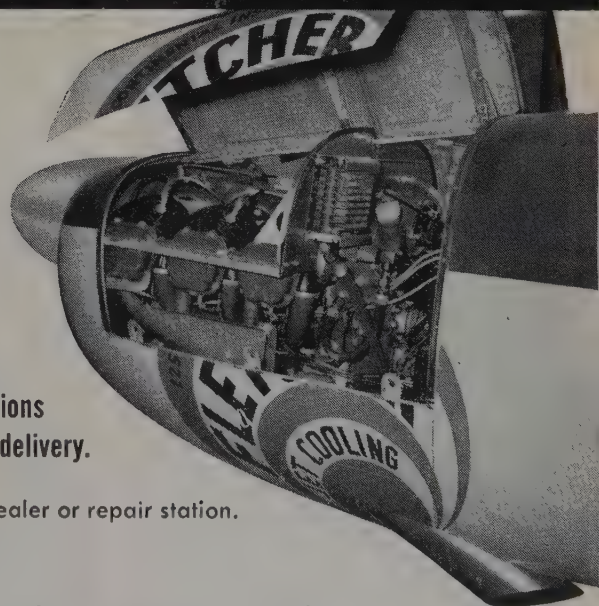
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(Continued on page 60)

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(Continued from page 59)

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# Turboprop Airplane

(Continued from page 20)

so that a free windmilling propeller will not create too great an aerodynamic disturbance.

## Turbine Failure

The most serious problem encountered to date in turboprop-powered airplanes is that of turbine failure during take-off or landing approach. In single-engine installations, severe drag conditions and loss of longitudinal control can be encountered from which there is insufficient time for recovery when the failure occurs within a few hundred feet of the take-off or landing surface.

Multi-engine installations have the problem of directional and lateral control requirements during an engine failure which far exceed those required for reciprocating-engine installations.

Another problem which can be classed as an engine failure is that of loss of pitch control on the propeller allowing the propeller to seek flat pitch. Present aerodynamic studies indicate the propeller pitch-control failure to be almost as serious as turbine, even though the possibility of occurrence is probably more remote.

The high drag encountered during engine failure is due to the high motoring power requirement of the compressor and the very low propeller-blade angle used for the engine-idle condition. In order to meet the engine-failure requirements of the Bureau of Aeronautics, a flight low-pitch stop of 25° is required for the Convair Model XP5Y-1. Since this 25° low-pitch propeller stop cannot be tolerated by the engine in the approach condition another solution must be found.

Automatic feathering is a possible solution to this problem. If it is used, auto-feathering must provide engine-failure protection for both the take-off and landing. The main disadvantage of automatic feathering is the number of pieces of equipment that must function in a very serious emergency. If they don't, the airplane will be lost.

Automatic decoupling appears to provide the most satisfactory type of engine-failure protection. For multiple turbine units it offers the advantage of keeping the maximum number of turbines operating. On single power-section installations it provides a simple direct method of engine-failure protection without the unreliability of complication.

Protection for a propeller pitch-change mechanism failure must be provided in view of the high drag of a non-rotating turbopropeller in the flat-pitch position. A simple pitch-lock mechanism seems to offer an adequate solution to the problem.

## Engine Maintenance

Solutions for the problems mentioned appear to be forthcoming in the not too distant future. However, the problem of initial setting and maintenance of the engine-control system has been very time-consuming and somewhat grating on tempers. If an attempt

were made to put present-day turboprops into field service, the result would be utter chaos. Even the aircraft manufacturers have found that with their skilled experimental personnel and service facilities, there are many times when the required tools or intelligence are not at hand. Maintenance procedures are very complicated and require the application of electrical and electronic engineers for trouble-shooting where commonly shop electricians and mechanics are able to handle the job. Parts are far from interchangeable. The parts that make up a control group for an engine must be tuned as a complete unit. Then, when any one piece is changed, the entire process must be repeated. A great deal of work must yet be done to make the present-day turboprop engine a good service unit.

## Summary and Recommendations

Summing our operating experience seems to indicate that we need to get our turboprops flying to determine whether the pitch-lock mechanisms, decoupling mechanism, and fuel-control tolerances are in reality solutions to the operating problems encountered to date. Our experience, meager as it has been, would indicate that standard aircraft quality workmanship in electrical harness and "black box" internal wiring will provide equipment with adequate service life. The principle failing in engine-control systems to date has been mechanical failure of electrical components. Manufacturing and mechanical-design techniques must be developed to provide the type of reliability required for a primary engine-control system. A very large step must be taken to provide servicing, trouble-shooting procedures and check-equipment for the engine-control systems so that typical aircraft mechanics and electricians can accomplish the task.

Extension-shafting problems have been somewhat complex and the model XP5Y-1 installation has not, as yet, given the type of service expected of a complete powerplant installation. However, modifications are under way which will go a long way toward the solution of our problems. Convair believes that solutions to the extension-shaft problems are desirable since it is somewhat of a basic power-transmission problem for large airlines where buried engine installations offer performance gains.

The operation of a turboprop airplane is in reality quite simple when all components function properly. Engine run and checkout procedures are very simple and a turboprop airplane can be put into the air in much less time than a reciprocating engine-powered airplane. Even though turboprop engines in the United States are in the embryo stage of development, their future is bright. ✈

*This paper, "The Turboprop Airplane," is printed through the courtesy of Institute of Aeronautical Sciences. It was presented at the IAS 20th Annual Meeting at the Hotel Astor in New York. Charts are reprinted through courtesy of the SAE.—Ed.*

## Aeronautical Advisory Stations Lodge Complaint

Expect a kick on the improper use of 122.8. Originally intended for just the transmission and receipt of non-control airport advisory information, such as field condition, pattern direction, etc., this frequency is now becoming a catch-all for all the unrelated and excess gabbing that seems to be pent up in some pilots. "Cook's Tours," "Hi, ya Joes," interminable and unnecessary test callings that have occasionally plagued other frequencies, have descended on 122.8 mc en masse.

Injudicious use for personal chit-chat between pilots rather than the intended exchange of vital and useful flight condition information, repeated callings to check distance, reminiscent of the early days of DX radio hams, and other inconsiderate abuse of this frequency will destroy its value and the intent of CAA and FCC in making it available. Its use may be lost.

If cockpit self-discipline is not the answer, then social ostracism among fellow pilots may be called for. In any case, its use for other than serious, purposeful transmissions may lead to its elimination.

## 3105 Kc To Go Next

These are indeed changing times. Technical advancements in the field of aviation are bringing about many changes, most of which establish themselves in time as definite improvements.

Changes are challenged as soon as proposed and out of the ensuing battle of opinions, weaknesses and strong points are brought to light and final decisions made based on facts rather than ideas of individuals. The statute mile—decision deferred! The new Phon(y)-etic Alphabet—under public appeal! The airline non-VHF common calling frequency to station and tower, 3117 kc—found guilty of not justifying its retention and eliminated! The "night-calling" frequency alternate to 3105 kc, 6210 kc—the same and eliminated!

Now, 3105 kc, the remaining non-VHF common calling frequency for all users, is under indictment. Word is beginning to go out to government stations and towers countrywide, to make a survey of the usage of this frequency,

It is common knowledge that virtually no new transmitting equipment is being manufactured on this frequency for domestic use. Likewise, the superiority of VHF under most conditions is unquestioned. The justification of the maintenance of existing receiving facilities on this frequency as well as the need for the space and funds for additional VHF is a strong argument.

However (and on this qualification, lives and valuable equipment may depend, as it does on all communications at critical moments), it is no secret that thousands of aircraft are solely reliant on this frequency alone and its elimination at this time would be a mandatory edict to invest in new equipment.

Even more important, there are pilots

having both and facilities for listening on both this frequency and VHF, who can quote thousands of instances in which failure of VHF equipment and/or other conditions have made this frequency the difference between effective radio contact and no radio at all. For the latter condition, a whole set of regulations, procedures, etc., is continually established and re-established under the justified terminology of "Emergency"!

Obviously, the purely VHF 121.5, which is more mis-used by the military than used by civilians in this extremity, is no substitute yet. Maybe the extra transmitters on 3105 kc and long-range antenna characteristics at all altitudes still carry their weight literally and justifies not junking them just yet!

## ILS Installations

The ILS program is being expedited throughout the country in anticipation of this coming winter's needs. New installations, modifications and relocations are proceeding as rapidly as funds will permit. Information is not complete in all cases but can be obtained locally or by watching latest issue of the Air Guide and manual revisions. AUGUSTA, Ga.—Bush Field. The installation on 109.9 mc serving Runway 35 should be completed. Outer Comlo and Marker on 233 kc, Middle on 221 kc.

AUSTIN, Tex.—The Outer Comlo is now on 404 kc.

CHARLESTON, S. C.—The Outer Comlo is now on 251 kc.

CHATTANOOGA, Tenn.—New installation on 109.5 mc serves Runway 19. Outer Comlo on 215 kc, Middle on 201 kc.

COLUMBUS, O.—The construction work near the runway nears completion. The ILS was scheduled for re-commissioning Oct. 1. GREENSBORO, N. C.—New ILS on 109.9 mc, serving Runway 14, Outer Comlo on 254 kc, Middle on 233 kc, should be officially commissioned.

DALLAS, Tex.—The modification should be completed by this time and ILS re-commissioned.

LANSING, Mich.—The new ILS

is being preceded by the Outer and Middle Comlos on 236 kc and 219 kc respectively.

MOBILE, Ala.—Bates Field. Installation completed on 109.9 serving Runway 14. Outer and Middle Comlos on 371 kc and 359 kc respectively.

NEWARK, N. J.—Linden Comlo on 359 kc decommissioned permanently. New ILS system for new instrument runway may be ready before the runway itself.

RALEIGH, N. C.—ILS frequency now 108.3 mc.

ROCHESTER, N. Y.—New ILS on 108.3 serving Runway 28 should be commissioned by this date. LOM and LMM are on 400 kc and 215 kc respectively. WINSTON-SALEM, N. C.—New ILS on 110.3 mc serving Runway 33, due for early commissioning. Outer Comlo on 317 kc and Middle on 299 kc have been in operation for some time.

TOLEDO, O.—The Low-Frequency range station has been relocated about eight miles SSE of the airport and the courses swung accordingly. Also a new MHW installed at Genoa, O. about four miles SE on 219 kc, identification "GNO", suggesting early approval of an LOM approach.

(Continued on page 62)

## CAA Requests Reports on any Erratic VOR's

The CAA has asked for the cooperation of the industry in the actual service flight testing of the new system of "Victor" airways. Where scheduled airlines have their own organizations through which they can report irregularities encountered in VOR range operation, professional pilots, such as corporation aircraft pilots, private pilots and irregular operators, should submit their comments addressed directly to the Regional Administrators or via their associated organizations, i.e. CAO, AOPA, etc.

If you have ever noticed occasional and unexplained erratic operation of the Omni course needle while enroute, you might try turning up your volume and listening. Quite likely you will find voice transmissions in progress. CAA operators have been cautioned to watch for and avoid over-modulation during broadcasts, either of weather and routine reports or in responding to aircraft calls. Certain levels of modulation have been determined and established and any exceeding of these levels, accidentally or to try to improve readability, results in erratic course indications in receivers.

If this happens to you, advise the operator at the earliest practicable opportunity and he can correct the situation by adjusting his controls.

## Radar Traffic Control

Non-professional pilots operating into the large major terminals have been running into new problems as our airway congestion grows. The introduction of radar traffic control at Washington, LaGuardia and other hubs of the airways imposes new problems in the solving of old ones.

Radar, the latest pet of the CAA, is being employed increasingly to relieve the time-honored delays encountered at these terminals in just getting off the ground IFR-wise. Any die-hard critic of the CAA, who just can't believe that that agency is breaking its back to try and give the ultimate in service to the industry, could get an eye-opening lesson from a visit to such a terminal CAA tower during IFR conditions.

However, equipment limitations of many non-airline aircraft contemplating IFR flight has proved something of a problem in itself. It takes a big and expensive airplane to carry the multiple-channel VHF radios necessary to take

advantage of these new developments which always seem to carry with them a half dozen new frequencies to change to.

Meanwhile, for those equipped to cope with them, radar departures offer the following: an opportunity to get going IFR without the interminable ground delays so irritating to professional company pilots and uncomfortable to their passengers; and a sharing of the burden of separation which in high-density areas keeps the most pilots suffering cricks in their necks.

A strong caution is necessary with regard to both of the above. A tendency to expect miracles often turns early enthusiasts into implacable opponents of a new facility or service. Radar departure procedures can get aircraft into the air IFR with virtually VFR separation minimums on take-off, *provided* the altitudes and intersections along the routes can accept that traffic!

Where take-off delays used to mount for both reasons, such delays can now be charged solely to lack of airspace enroute and crossing separation minimums and should be recognized for such. Similarly, radar can share the burden of traffic spotting (traditionally, the pilot's) under VFR take-off conditions, but only a fair understanding of the essential characteristics of radar presentations will help a pilot understand that, in VFR conditions, both the pilot and controller will occasionally "spot" traffic that the other cannot see. Under IFR conditions, this latter problem doesn't exist as each aircraft ideally is operating under completely controlled conditions.

The CAA calls this latter service "Additional" and makes it quite clear that in addition to the traffic separation from known IFR traffic that the radar controller will supply, that any additional advisory traffic information supplied upon request or volunteered is just exactly that and the responsibility of the pilot to maintain a vigilant watch when VFR, remains.

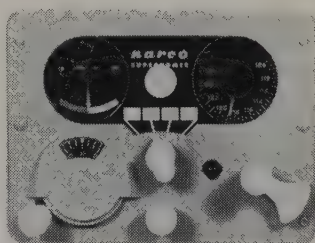
The "head down and locked" pilot who has been responsible for the fact that the clear majority of aerial collisions have been in CAVU will not get a lift from radar!

## Atlantic Coast Facilities

All Region One (Northeastern U.S.) VOR's have completed their modernization and users should expect improved results. The conversion of the Atlantic Coast VAR airway to VOR is in progress and delays caused by the necessity of site relocation are expected to be kept at a minimum. Conversion to VOR should take the pressure off the LF airway Amber 7 to some extent during IFR along the popular New England to Florida route.



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Nautical Mile Plotter

Much has been made, and still is being made, of the contemplated change-over to the nautical mile for all aviation purposes. The temporary reprieve granted civilian aviation by the postponement currently in effect may mean just that and nothing more. There has been no official announcement to deny that eventually, if not sooner, the change will become effective and all charts, instruments or flight planning and other thinking based on the familiar statute mile will become obsolete and ineffective.

Inasmuch as the pain of changeover is the principal objection raised to the plan, it has moved cooler heads to contemplate ways and means of making this issue as painless as possible, both as and if it occurs.

The Weems people, famous as leaders in the navigational practice and instructional field, have jumped into the lead with a nautical-mile version of their famous Mark II plotter, called the Mark II-N. It eliminates the necessity of converting with previous plotters from statute miles to nautical by reference to the appropriate indices on the numerical scales of the old statute-mile plotters. Direct use in conjunction with any problem involving nautical miles or the charts listing only nautical miles or both nautical and statute, is possible without any mental gymnastics.

Similarly, it retains the facility of conversion back to the statute mile with a similar set of appropriate indices for this purpose. At a cursory glance, it looks identical to the other plotter and should not feel unfamiliar in manipulating.

Retailing at \$2.50, the Weems Nautical Mile Plotter justifies its investment to the pilot in that he can use it for practice transition (all charts are currently showing both mileages and scales) as well as all necessary use, as in the case of military and others already working the nautical-mile way.

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## VOR/DME Airway Evaluation Report

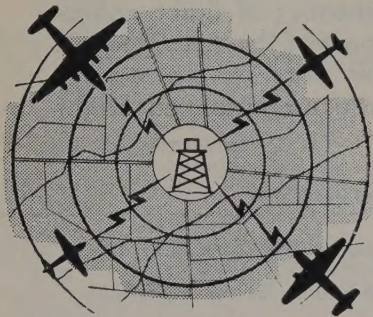
Publication of results of the CAA flight evaluation tests of the New York-Chicago VOR/DME airway should make interesting reading for the many professional pilots who have been using the VOR part for some time. Six CAA DC-3's from all over the country participated and all phases of the operation were gone into thoroughly, including ground facilities maintenance and operation, airways procedures, etc.

Inasmuch as professional non-airline pilots operate across established airline routes as much as along them, the expected announcement of CAA policy with respect to the application of VOR/DME to IFR procedures will be both vital and interesting.

The advantages of VOR/DME operation will be considered by many professional corporate pilots in the light of the availability of a reliable, lightweight airborne DME receiver costing much less than the present equipment that is suitable only to the heavier airline-type aircraft.

An announcement that the current program to develop this instrument is being expedited would be a welcome companion piece to the report.

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## Airport and Airways Facility Changes

Airport and airway facilities are constantly being changed. Most changes are modifications or improvements designed to eliminate past deficiencies or to improve the facility and service to the flying public generally. Such changes are usually publicized in as wide a manner as possible, but inherent delays or occasional omissions plus average pilot reluctance to pour through interminable country-wide coverage and fine print often result in vital changes going unnoticed until operational use is called for, as on an instrument approach.

Therefore, NAVICOM, as a public service, is going to try spotting and high-lighting as many of the most significant changes as possible, in the hope that in checking your charts and other flight reference manuals, your attention will be called to vital changes that you might have missed.

The following changes should be looked for, or made on the latest charts.

**AUGUSTA, Ga.**—The VOR range resumed operation in new location, on the same frequencies, 113.9 mc, without voice until officially re-commissioned.  
**BELFORD, Mass.**—Runway 17-35 closed to take-off and landing permanently—reserved for parking only.

**BRIDGEPORT, Conn.**—Tower now transmits on 203 kc and 121.3 mc.

**DENVER, Col.**—The VAR range on 109.1 which was shut-down last June, should resume operation shortly as a VOR. Frequencies can be obtained through the LF range.

**DOVER, Del.**—The VAR range converted to VOR on 114.8 mc, test basis at press time. The new MHW homing beacon on 206 kc already converted to a Low Frequency 4-course range on same frequency, courses 231°-314°-051°-134° magnetic towards the station.

**SPECIAL NOTE**—Caution! Anticipate possible interference from Mt. Vernon MHW on 203 kc at Washington, and from powerful LaGuardia range on 209 kc!

**HUNTINGTOWN, Md.**—New MHW homing beacon on 269 kc at the intersection of SE course

of Washington and the S course of Baltimore LF ranges. Identification "HNT".

**KNOXVILLE, Tenn.**—CAA has issued NCTAM on the VOR range. Only reliable courses are those towards Tri-City on Green 5 and towards Lexington on Red 27.

**NEW ORLEANS, La.**—Callender, MHW facility changed to 269 kc.

**NEW YORK, N. Y.**—Idlewild range frequency now 379 kc, Glen Cove now on 248 kc (old Idlewild frequency).

**NORFOLK, Va.**—VAR range on 108.7 shut-down for conversion to VOR.

**OKLAHOMA CITY, Okla.**—The ILS markers and compass locators have been spread out an additional fifth of a mile, the Middle Marker and Comlo being moved about 234 feet closer to the end of the ILS runway and the Outer Marker and Comlo moved almost 900 feet further away. The new Glide Path interception altitude will probably be announced when the ILS is re-commissioned.

**SHREVEPORT, La.**—The combined Tower and Comm. Station (Downtown Airport) and Weather Bureau has been moved to Greater Shreveport Airport (6 miles SW of town). Same frequencies for the tower.

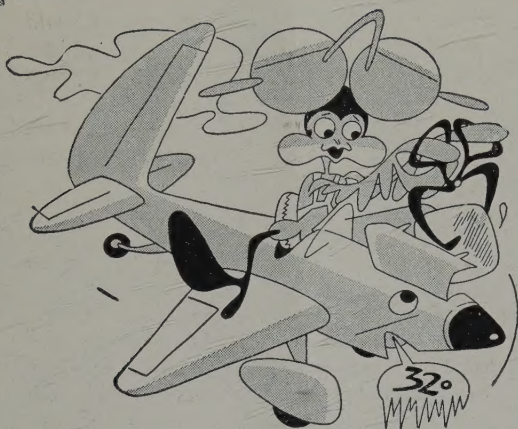
Range voice communication on 230 kc, 112.9 and 255.4 mc should have resumed operation. ILS on 110.3 mc serving Runway 13. Outer Comlo on 219 kc.

**WASHINGTON, D. C.**—Mt. Vernon MHW should now show frequency 203 kc instead of 269 on your approach charts.

**WILMINGTON, Del.** ILS Middle Marker and Comlo commissioned on 382 kc, ident. "LG", located .7 mile from end of Runway 1.

**QUANTICO, Va.**—Navy LF range, last on 251 kc instead of 203 kc, temporarily shut down, may emerge as MHW when re-commissioned. (Used as check-point into Washington).

If the VHF Fan Markers sound disturbingly different to you cross-country lately, it is because many of them are being changed from 96 dashes per minute to 48, and from 48 to 24 dashes per minute.



**When the iceman comes  
to the carburetor...**

**You're cruising along**, and suddenly—hang onto your hats, kids!—down goes the airspeed. And with it you get a drop in rpm (with a fixed-pitch prop) or a drop in manifold pressure (with a constant-speed prop). That's probably ice, brother. *Then* what? Your next three moves are:

1. Change carburetor heat to "full hot."
2. As soon as the engine gets rough, change to "full cold." If ice was present and has been eliminated, you should get an increase in rpm (with a fixed-pitch prop) or a rise in manifold pressure (with a constant-speed prop).
3. Now adjust the heat control to a happy medium that maintains a set airspeed and power setting.



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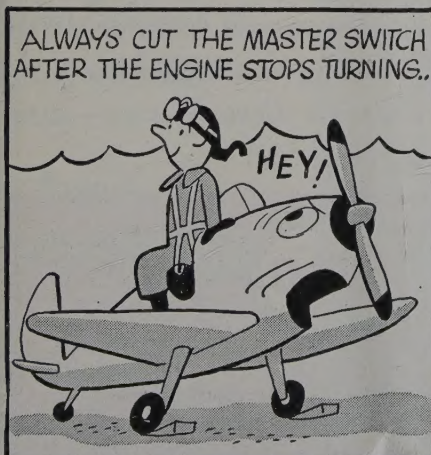
### How to s-t-r-e-t-c-h the time between engine overhauls



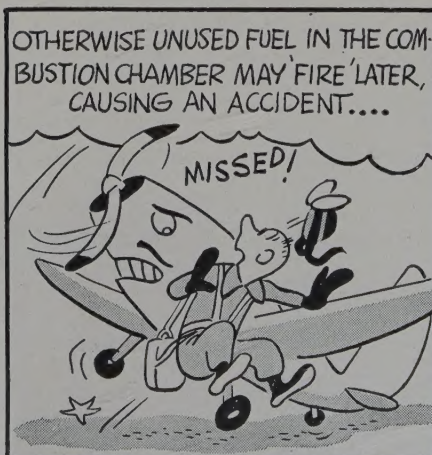
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**2—In radial engines**, or where a detergent oil is not desired, use Gulf Aircraft Engine Oil, Series-R. It's the very finest non-detergent straight mineral oil on the market. Pratt & Whitney and other manufacturers have approved it for all types of service in radial engines.

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